RAILROAD GAZETTE

FRIDAY, OCTOBER 6, 1899.

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Recent Improvements on the Northern Pacific.

Last week we published some notes from the advance sheets of the annual report of the Northern Pacific. At that time we did not have the pamphlet report, which has now been received. Below are some extracts from the report of Mr. Kendrick, Second Vice-President, and head of the operating department. This is particularly interesting as showing some of the improvements in track and equipment which have been carried out within the year reported on and some of the important economies which have been realized from these improvements.

The extensive improvements in the physical condition of the system have been continued and exceed in extent those of any corresponding period. 250.88 miles main track have been relaid with new rails of 72-lb. section; 440.87 miles of track have been ballasted; 655.03 miles of embankment have been widened; 1,081,039 cross ties have been used in main line and 665,102 in branch line renewals during the year. The track operated now includes 562.48 miles of 72-lb. steel and 1,322.94 miles of 66-lb. steel.

The work of grade revisions, removing sags, rectification of line and bridge filling has been continued, requiring the handling of 2,855,952 cu. yds. of earth. The grades on second district of the Dakota Division, Jamestown to Mandan, have been reduced from 1 per cent. to 0.4 per cent. in both directions. On the second district of Yellowstone Division 1.25 per cent. grades have been reduced to 1 per cent., which gives a maximum grade of 1 per cent. between Mandan and Glendive. On the fourth district the revisions of line and grade at the Big Horn, Myers and Huntley Bluffs have resulted in a reduction of 0.5 per cent. to 0.25 per cent. On the Montana Division mountain grades have been reduced from 2.1 per cent. to 1.9 per cent., which necessitated a change in line three and one-half miles in length. Between Logan and Bozeman the grade has been reduced from 1 per cent. to 0.8 per cent., and between Helena and Logan from a working maximum of 0.5 per cent. to 0.4 per cent., helper engines being used over the unavoidable 1 per cent. grade between Townsend and Winston. On the Rocky Mountain Division reduction of grades between Garrison and Avon from 1 per cent. to 0.6 per cent. was completed to such an extent that it can now be operated as a 0.7 per cent. grade, and a small expenditure will complete the reduction to 0.6 per cent. On the Idaho Division the east-bound grades of the second district have been reduced from 1 per cent. to 0.7 per cent., and 14 bridges have been removed by making channel changes and the grade has been raised to avoid future water troubles in the vicinity of Hatton. Change of line has been made at another point near Hatton, eliminating a large amount of curvature and two bridges. The eight remaining bridges have been replaced by permanent structures to prevent casualties which might result from their destruction by fire on account of their location upon unavoidable curves. On the third district of the Idaho Division west-bound grades have been reduced from 0.8 per cent. to 0.5 per cent., except between Kennewick and Kiona, where an assistant engine will be employed. This district is operated at the present time upon the basis of 0.6 per cent. maximum grade. On the Pacific Division grades have been reduced between Tacoma and Lester, east-bound, from 1.3 per cent. to 1 per cent.

The impracticability of securing a uniform maximum grade upon all divisions of the main line and the great desirability of increasing the tonnage of trains, and, as far as possible, making this tonnage uniform upon adjacent divisions, has led to an approximate equation of power and grades. It has been found that the saving which has resulted from the pursuance of this policy is far in excess of the estimated saving incident to grade revisions alone. This is largely attributable to the adoption of heavier power adapted to the requirements of the various divisions.

The results that have attended the adoption of improved methods of operation and reduction of grades are best shown by the following statement, covering the period from 1890 to 1899, inclusive.

Year.	Mileage Operated.	Rate Per Ton Mile.	Revenue Per Train Mile.	Revenue Tons Per Train Mile.
1890	3,584.8	$0 0140	$1.843	130.23
1891	4.222.2	0 0138	2 019	145 28
1892	4,411 9	0.0140	2.095	147.95
1893	4 442.9	0.0123	1.904	153.07
1894	4,468 8	0 0111	1.632	144 98
1895	4,469 0	0 0111	1.837	163.74
1896	4.404 3	0 0113	2 222	193.52
1897	4.767.4	0.01139	2 122	184.35
1898	4,362.0	0.01065	2.850	264 59
1899	4,579 3	0 01047	2.955	277.60

Comparison of 1890 and 1899 shows an increase of 57 07 per cent in ton miles; a decrease of 21.62 per cent. in train miles; an increase of 113 16 per cent. in tons per train mile, an increase of 38.09 per cent. in tons per loaded car mile; a decrease of 25.21 per cent. in revenue per ton mile, and an increase of 60.34 per cent. in revenue per train mile.

The net increase in side-track mileage is 65.65 miles. Fourteen steel bridges with masonry piers, authorized during the preceding year, have been completed. Authority has been given for the construction of fourteen steel bridges during the present working season, and the work is now in progress. By the end of the current year the tunnels on the main line will all be permanently lined with concrete and masonry, and the delays and great expense incident to the destruction of tunnel linings of timber will be a thing of the past.

The old-style fuel stations are being replaced as fast as they require renewal by improved fuel stations, in which the coal is elevated by gasoline or electric motors, which is resulting in a considerable decrease in cost of handling fuel. A reservoir has been constructed at Dickinson, on the first district Yellowstone Division, for the purpose of collecting water resulting from the melting of snow in spring, so as to avoid the use of alkaline water. At Fargo the company has arranged to pump its water from the Red River by electric power, which will work a considerable reduction in the cost of water at that point. Wherever practicable, steam pumps are being replaced by gasoline motors, which can be cared for by the agents or coal handlers. Gravity systems are being inaugurated wherever possible, and these various changes will result in a very considerable saving in the annual cost of water supply. The introduction of improved fuel and water plants also greatly facilitates the movement of trains, and the policy of replacing the older types until the entire main line and important branches are thoroughly equipped is recommended.

The relation between the hauling capacity of engines at present in service and those which were in service at the beginning of the fiscal year is shown by the following statement:

	Number of Engines.	Total Weight on Drivers.
Assignment June 30, 1898	542	44,432,965
Added during fiscal year	38	4,837,515
	580	49,270,480
Sold and destroyed during fiscal year	10	587,015
Assignment June 30, 1899	570	48,683,465
Net increase	28	4,250,500
Percentage of increase	5.2%	9.6%

The horse power capacity of all engines assigned to road service, as compared with engines assigned to same service at the beginning of the fiscal year, is shown by the following statement:

	Number of Road Engines.	Total Horse Power Capacity.
Assignment June 30, 1898	460	263,625
Added during fiscal year	31	30,050
	491	293,675
Sold and destroyed during fiscal year	5	2,470
Assignment June 30, 1899	486	291,205
Net increase	26	27,580
Percentage of increase	5.6%	10.5%

The horse power shown is that which the engines are capable of developing continuously under speeds which are applicable to the service to which they are assigned. Eight passenger and twenty-two freight engines were purchased from the Schenectady Locomotive Works, for delivery during the summer and early fall of 1899, and will serve to increase the tractive power of all engines about 8.5 per cent.

The performance of engines and cost of repairs are shown by the following statement:

Year Ending	Mileage of Engines.	Ton Miles.	Cost Shop Repairs Per Engine Mile.	Total Cost Repairs. Per Engine Mile.	Per 1,000-ton Mile.
June 30, 1898.	14,475,659	7,374,541,550	$0.0259	$0.0384	$0 0755
June 30, 1899	16,394,688	8,571,841,574	.0219	.0375	.0718
P.c. of In. or Dec..	13.2%	16.2	15.4%*	2.3%*	4.9%*

*Decrease.

The increased tonnage of trains, as compared with previous years, as indicated by an increase of 1,197,300,024 ton-miles, with an increase of 1,919,029 engine-miles, has resulted in a corresponding increase in the repairs to locomotives, occasioned by the hard service to which they were subjected.

This company now has 71 compound engines of different classes in service. The results obtained have been entirely satisfactory. All of the compound engines continue to show very material economy in fuel consumption when compared with simple engines in same or similar service on the same districts. The introduction of compounds was commenced three years ago, but none have yet received general repairs.

The equipment of ten complete overland trains with steel platforms, wide vestibules and M. C. B. couplers was commenced in the early spring of 1899 and is now practically completed. During the year 174 freight cars have been reinforced for the purpose of increasing their capacity. The limited number reinforced during the past fiscal year, as compared with previous years, is due to the fact that this work is now nearly completed, and it has been found especially difficult to secure the balance of the cars for treatment. This work has included the substitution of pressed steel diaphragms for the spool separators in the body bolsters; increase in depth of trussing of wooden-truck bolsters; increase in depth of under trussing; substitution of malleable for cast-iron queen posts in connection with same; changing out of axles of insufficient size to meet the conditions of increased loading, and such general repairs as were found to be necessary. The result has been to concentrate a considerable amount of repairs, which would otherwise have been distributed over a long period and would only have received attention as defects developed. The work of reinforcement is something entirely separate and distinct from ordinary repairs. It has resulted in giving us a very large increase in carrying capacity, and in the general overhauling of all of the cars so treated, so that their condition has been improved in every way. The cars reinforced since the inception of this plant number 5,760, with an increase in capacity of 28,800 tons. The increase since 1896 is equivalent to 960 cars of 60,000 lbs. capacity. Five hundred more cars of all classes are to go through the shops for this purpose. In addition, it has been decided to reinforce 1,655 gondola cars, so as to increase their capacity from 40,000 to 50,000 lbs. each—a matter of great importance, as such cars can always be loaded to their capacity, being used principally for the transportation of coal. The result of this treatment will be to place all of this class of equipment in uniformly good condition, and to afford an increased carrying capacity equivalent to 331 cars of 50,000 lbs. each, without increasing the dead weight to any appreciable extent.

A Fine Run Between Philadelphia and Atlantic City.

The fastest running in the world, considering distance and weight, has been done for some years on the two lines from Camden, opposite Philadelphia, to Atlantic City, the distance by the Pennsylvania Railroad being 58.3 miles, and by the Reading 55.5. Of course the reader is familiar with the records made there in regular service, as well as with many of the fine special runs. Last July, page 487, we showed engravings of the Pennsylvania's new Atlantic type engines, Class E—1, lately turned out from the company's Juniata shops at Altoona for this run. The engine there described was No. 698, being a simple engine with cylinders 20½ x 26 in., four drivers coupled, 80 in. in diameter; 56 in. trailing wheels under the firebox, and a four-wheeled truck forward. These engines weigh 101,550 lbs. on the drivers and 173,450 lbs. total in working order. The total heating surface is 2,320.4 sq. ft. and the boiler pressure is 185 lbs. The tractive power, with mean effective pressure equal to four-fifths of the boiler pressure, is 22,052 lbs.

Engine No. 698 made a particularly fine run on Sept. 11. The train hauled consisted of two parlor cars, one combination car and two day coaches weighing empty 348,950 lbs., and had 152 passengers on board. It left Camden station at 5.08 p. m., three minutes late. It passed all stations, including East Hammonton, 33.8 miles out from Camden, still three minutes late. Before reaching Absecon, 52 miles out from Camden, four minutes had been made up, and the train passed Absecon one minute ahead of time. It reached Atlantic City on time at 6 p. m., distance 58.3 miles; rate, 67.2 miles an hour. The Superintendent of the West Jersey & Seashore Railroad (Pennsylvania System), Mr. A. O. Dayton, gives the following further particulars:

Four minutes were used in running through the city limits, Camden to Liberty Park; distance, 1.8 miles. From Liberty Park, at 5.12 p. m., to Berlin, at 5.25 p. m.; distance, 14.3 miles, the schedule time of 13 minutes was made, an average of 66 miles per hour. This is seldom done because of the heavy grades. From Berlin, at 5.25 p. m., to East Hammonton, at 5.39 p. m., distance 16.8 miles, the schedule time of 14 minutes was also made, showing a rate of speed of 72 miles per hour between these points. This is frequently slightly exceeded. From East Hammonton, at 5.39 p. m., to Absecon, at 5.51 p. m., distance 18.7 miles, the run was made in 12 minutes, or at a rate of speed of 93.5 miles per hour. The top speed appears to have been reached at Germania, which station was passed at a rate of speed exceeding 100 miles per hour—the time according to the train register showing a speed of 108 miles per hour between Egg Harbor and Germania, distance 2.7 miles, and considerably faster than that between Germania and Pomona; but finding some questionable figures at Germania and Pomona, I have worked around them by taking the figures at Egg Harbor and Doughty, which show a speed of 93.6 miles per hour over the 7.8 miles between these points. [The grade for this 7.8 miles is slightly undulating, with a total fall of 29 ft.]. In order to verify this very high speed I have carefully figured out other parts of the run. Some of these figures are:

Berlin, at 5.25 p. m., to Pomona, at 5.46½ p. m.; time consumed, 22½ minutes; distance, 30 miles; rate of speed, 83.1 miles per hour.

Waterford, at 5.30 p. m., to Pomona, at 5.46½ p. m.; time consumed, 16½ minutes; distance, 23.7 miles; rate of speed, 86 miles per hour.

Hammonton, at 5.36 p. m., to Pomona, at 5.46½ p.

m.; time consumed 10½ minutes; distance, 16.2 miles; rate of speed, 92 miles per hour.

Elwood, at 5.40 p. m., to Pomona, at 5.46½ p. m.; time consumed, 6½ minutes; distance 10.1 miles; rate of speed, 93 miles per hour.

Steel Foundations for Steam Railroad Track.

By Gustav Lindenthal, C. E.

(*Continued from page 675.*)

IX.

The success with solid concrete and iron foundations for street car track in cities, suggested some time ago the use of concrete for the tracks of steam railroads. The best plan of that kind proposes longitudinal concrete sleepers or beams of trapezoidal section, with a base 26 in. wide resting on the ballast or earth, and with the narrower side on top, to which the rail is firmly bolted, shown in Fig. 10 and 11. It is described in the "Engineering News" of January 5, 1899, and March 23, 1899, and a discussion of same is here not out of place.

It will be observed that the rails are in continuous contact with the sleepers, which are 10 ft. long; and that they are kept in gage by special gage rods. The system affords ample bearing surface on the ballast, and would have much to commend it if concrete were not a brittle material. Concrete is never used in structures, where it would be exposed to shock or to strains, rapidly alternating from compression to tension.

Longitudinal sleepers are unavoidably exposed to severe bending strains and to alternate tension and compression from the heavy, concentrated wheel loads. They are liable to break, if of a brittle material, like concrete, stone, glass, terra cotta, or even cast-iron, all these materials having been proposed from time to time as rail supports. The best engineering practice prohibits cast-iron not only for beams, but for compression members in bridges and for all details, exposed to bending strain or vibration. It is true that cast-iron yokes are used in street car track, but they are made exceptionally heavy and are not exposed to alternate stresses. For longitudinal rigidity, the proposed concrete construction would therefore have to depend solely on the rail, the same as the cross tie system. The rails could not be made lighter. On the contrary, high stiff rails, with a wide base, would be necessary, to avoid excessive local pressures on the concrete from the wheel loads.

This will be clear from the following consideration: Taking the same heavy freight locomotive as before, with 25,000 lbs. on a driver, 60 in. distant from center of next driver, and again allowing 100 per cent. for impact (see part IV.), the rail (90 lbs. per yd.) would have to distribute 50,000 lbs. on a length of 60 in. on the concrete. If uniformly distributed it would amount to 155 lbs. per square inch of railbase, but there is little doubt that immediately under the wheel and at the joints the pressure would exceed 1,000 lbs. per square inch and crush the surface of the concrete.

Assuming, however, the load to be uniformly distributed, with good contact between concrete and rail, the latter may be again assumed to act like a reversed continuous beam, with the wheel points as supports, and the pressure on the concrete acting as a uniform load upward. The bending moments will therefore be likewise at wheel points 250,000 inch pounds, and at center between wheel points 125,000 inch pounds.

For the 90-lb. rail having I = 34 and R = 13.5, the extreme fibre stress under the wheels will be

$$f = \frac{250{,}000}{13.5} = \pm 18{,}500 \text{ lbs. per square inch.}$$

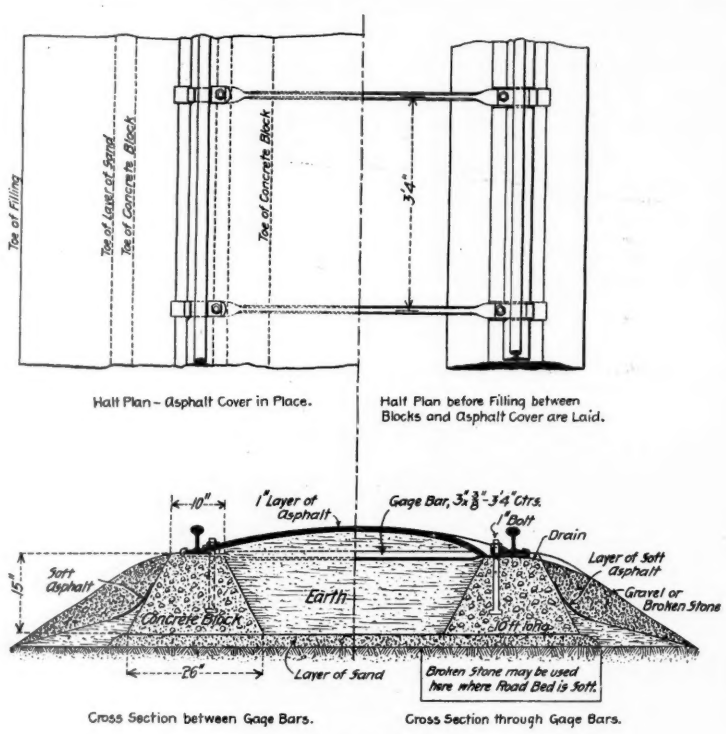
Between the wheels the fiber stress will be one-half of that, or ± 9,250 lbs. per square inch. The fiber stresses will therefore alternate between 18,500 plus 9,250 lbs. = 27,750 lbs. between extremes of tension and compression. It has been shown in part IV. that on the longitudinal steel sleepers, with rail supports 24 in. apart, the maximum fiber stresses alternate for the same 90-lb. rail between 200 and 16,550 lbs., or 16,750 between extremes, and that, most important, the deflection will be only 0.0135 in. in a length of 60 in., which is so small that pressure on the ballast or the earth will be uniform.

The deflection, alternately up and down, under the same conditions of load for the concrete sleeper would be 0.03 in., which is 2½ times greater. (From formula $d = \frac{P l^3}{E I 384}$)

The concrete beam must bend 0.03 in. or $\frac{1}{32}$ in. in 60 in., up and down, at the rate of 6 to 24 reversions per second, to conform to the bending of the rail in distributing the load uniformly upon the ballast or earth underneath, or, failing to do that it is liable to break from excessive local sudden pressures. The concrete beam, if per contra made shallow enough to deflect or bend without breaking, cannot be counted upon to any appreciable extent to relieve the bending strains on the rail, as the steel sleeper does; the concrete will therefore in any event act merely as a distributor of the load sideways upon the ballast or earth, which is precisely the function of cross ties, and nothing else.

It is true that the concrete sleepers could be strengthened by embedding in them longitudinal bars of iron or steel, interlocking with the holding down bolts. But that would increase the expense without removing another important objection, which is the weakness at the joints of the sleepers. The track foundation should be as strong there as elsewhere, which cannot be the case with the system proposed. It must not be overlooked that the above indicated strains and deflections (although based on extraordinary loads) apply only to continuous sleepers. They are much greater for 10 foot sleepers or beams. Metallic sleepers can be strongly and adequately spliced; concrete beams cannot be so spliced. It would be necessary to build them in situ as a continuous construction, and that would further add greatly to their cost.

Like the rail for the Hartwich system (which rests directly on the ballast), the proper form of a rail resting only on concrete would require a much wider base and greater height than that in use with wooden or steel ties, which means a more expensive rail, weighing not less than 170 lbs. per yd. (as indicated in part IV.) Stiff girder rails, 9 in. high, weighing over 100 lbs. per yard, are for that reason actually used on electric traction railroads, where they are supported for their entire length on concrete, and, in addition, have as a rule firm bearings on cast-iron frames, although the wheel loads and the speed are less than one-third of those on steam railroads. The concrete is rammed under these rails, after they are set on the frames, and thus a tight, good fit is insured. On ready-made concrete-sleepers it would be difficult to obtain uniformly good contact between the base of the rail and the top of the concrete, without considerable fitting, and when obtained, it would not remain so.



Figs. 10 and 11.

The rail, held down by bolts to the iron gage bars, as proposed in Figs. 11 and 12, would rest there on stronger and harder material, better able to resist abrasion, than the concrete between the gage bars. The expansion and contraction of the rail, the yielding at the weak joints of the concrete beams and the unavoidable bending up and down of the rail, however slight, would soon cause looseness of fit, permitting fine sand and moisture to get under the rail. The moisture under the rail freezing, destructive action would commence on the surface, first slowly, and increasingly faster, till the concrete sleepers would be hollowed out under the rails particularly at the beam joints and between the iron plates. The wear would commence and proceed in the same way as with angle splices at rail joints, which announce their looseness by the hammering at these points, or similar to the wear on cross ties under the rail. The occasional tightening of the holding down bolts at the gage bars would not help matters. Motion there certainly would be between rail and sleeper, and motion begets wear.

The joint proposed (not shown in the figure) for the 10-ft. concrete beams consists of a square iron dowel-pin and cast-iron sockets, set into the ends of the beams. It could not, of course, resist either much shearing or bending strains, and it is intended only as a connection to keep the beams in line. But with that construction it would be impossible to remove a broken or otherwise defective beam from its position without breaking it up into small pieces, probably by blasting; nor could a new beam having such connections be inserted in its place.

Another trouble would be with the rail joints; the rail ends could not be anchored firmly down on the concrete-beam to a base support which I have shown in part VI. to be necessary to prevent hammering. The first breaks in the concrete beams would occur under the rail joints, which would remain the same troublesome and noisy detail it now is on cross-ties. The creeping of rails, the cause of which I have explained in part VII., would occur with this system no less than with the cross tie system, because the bearings of the rail on the gage bars with holding down bolts only on one side of the rail would in a short time wear into the bent end of the gage bars and result in a loose and rattling connection, offering hardly more resistance to creeping than the spiked rail on wooden ties. Another disadvantageous feature would be in the laying of the track, in that the concrete beams must be put into precise position for gage and line, because the bolt fastenings through the gage bars do not permit of lateral adjustment of rails. It is thus lacking one of the principal advantages of the metallic system, which permits the final alignment and gaging of rails, whether on tangent or on curve, after the sleepers are in position in the ballast.

The concrete beams for curves would require separate forms, on which the holding down bolts must be accurately set to the curve of the rail. The laying of such track would be in the nature of a building operation, requiring skilled and higher priced labor, the same as laying a stone wall. Undoubtedly, the concrete sleeper can be reinforced and improved to meet the several objections made; but it will then cost much more than the metallic system for same strength, and approach the great cost of the electric traction tracks in New York.

But there is still one more objection, which cannot be so readily overcome. It is in connection with the settlement of railroad embankments. Depending upon local conditions of soil and filling material, the settlement of embankment requires sometimes many years for its completion. Some embankments 50 years old are still in process of settlement or consolidation. The keeping up of the grade on them is not properly chargeable to track work. The sag in the grade is allowed to reach 6 in., or maybe 2 ft., and then every few years the entire track is raised, as a rule, by gradual filling in of stone ballast, between and underneath the ties, which are thus kept levelled up.

This operation can be carried out without interruption of fast train service, and without difficulty with ties, and still better with the steel sleeper system; but would be a very expensive, if not impracticable operation with concrete foundations, particularly if they were continuous as they should be. This difficulty does not occur in established city streets, and solid concrete foundations for track are there justified as permanent work. But it would not be so justified on many railroad embankments sustaining otherwise a very heavy traffic. And further, steel sleepers, like cross ties, can be taken up in one place and used again in another. Concrete beams could not very well be so used.

X.

Steel sleepers, composed of angles as above described, are readily adapted for the form of rail section and rail chairs largely used in England. The double-headed rail is supported in cast iron chairs, and fastened with wooden keys. It is familiarly known, that only one head of the rail is ever used for riding. When worn down, the rail is not turned and the other head used, as was the expectation of the early designers. The bottom head having become worn in the chairs and too rough for riding in the meantime. But the old form of chair has been preserved, because it affords a firm base, and is saving of cross ties and has proven to be well adapted and durable for English conditions. There is great reluctance to change, and adopt the flange rail, spiked directly to the wooden tie. The expense for drainage and surfacing that kind of track is not less than with the flanged rail. Metal ties, as mentioned above, do not reduce this expense. They are favored, because more durable than the wooden ties, which have mostly to be imported to England and are more expensive than with us.

English rolling stock, being over 30% lighter than American rolling stock, does not require our substantial track construction of closely spaced ties. Metal ties have given better results in England and on the Continent than here, because they are as a rule more solidly made, and have to carry smaller loads. Relatively to load, the English track is stronger, although weaker than the best American track.

The longitudinal steel sleeper system of the angle pattern does not require more steel per mile than good metal ties, which have stood the test of prolonged wear. The bulb angles for American conditions weighing 50 lbs. per yard, need not weigh more than 40 lbs. for English conditions. The rail chairs for the double-headed rails can be readily adapted, and bolted or riveted to the top of the bulb angles. The combination will give a permanent track, having twice the rigidity of the old track, 25 per cent. larger effective bearing area on the ballast, and the expense account for maintenance reduced at least 50 per cent. from that for wooden cross ties. In short, for the money spent on metal ties, in England and on the Continent a greatly superior track construction, affording a profit on the additional capital, can be obtained with steel sleepers combined with the cast iron chairs and double-headed rails of the English system, wherever that is established. But as a track construction for a new railroad that combination cannot be recommended.

Conclusions.

Summarizing the discussion of permanent foundation for steam railroad track, the following conclusions are arrived at:

1. That steel ties in place of wooden ties do not offer sufficient economical advantages. Reduction of expense for track maintenance over that on wooden ties is either absent or too slight and uncertain. The safety of track not much greater, the riding not more comfortable. Good steel ties cost about $5,000 more per mile than wooden ties without saving at best more than the interest on the additional cost.

2. That longitudinal steel sleepers, with no more metal per mile than steel cross ties, offer greater bearing area on the ballast, greater longitudinal rigidity, superior smoothness and safety of track, least amount of creeping and greatly reduced expense for maintenance. Steel sleepers also cost about $5,000 more per mile than wooden ties, but the saving in maintenance will yield at least 10 per cent. on the additional cost.

3. Concrete as a foundation directly under the rail is too brittle and if designed to be on a par with steel sleepers, for durability, continuity and smoothness of track, would be too expensive, and sometimes entirely impracticable.

The Thomson Run Bridge.

The engravings show a fine trestle bridge built within a few months in the borough of Duquesne, Pa., by Mr. T. B. Murphy, a contractor of Pittsburgh. The bridge is on the line of the Monongahela Street Railway Company and was built from the designs of Messrs. Wilkins & Davidson, of Pittsburgh. It is 1,200 ft. long and 115 ft. high. The material used in construction included 180 cubic yards of concrete, 85 cubic yards of masonry, 230 piles, 750 M. ft. of timber and 40 tons of iron, exclusive of the tracks. The bridge was built in 70 days.

The concrete pedestals and blocking shown under the bents in the detailed engravings were only used for 16 bents at the ends where it was impracticable to drive piles. All the other bents were on pile foundations with 12 piles to each tower. The details of construction are so completely shown that further description is unnecessary. The towers, it will be observed, are 15 ft. longitudinally of the structure. These support 30-ft. spans, which spans are built up of trussed timber stringers. There are three such trusses, the compression member of each being two 8 in. x 16 in. stringers trussed with a rod 1¼ in. diameter for the outer trusses and 1 7/8 in. diameter for the middle truss. The strut under these stringers is a continuous framed girder transversely of the bridge, 7 ft. deep. The disposition of this can be seen in the general engraving, although the tie rods are hardly visible there.

Handling Freight Trains Partially Equipped with Air.

It will be remembered that this was the subject of a notable paper presented by Mr. C. L. Nichols, Superintendent of the Chicago, Rock Island & Pacific, before the Central Association of Railroad Officers, and published by abstract in our issue of October 22, 1897. At that time Mr. Nichols said that the experience on the Rock Island had resulted in their issuing the following instructions, and since the new rules had taken effect their troubles from break-in-twos had almost ceased:

"When there are non-air-brake cars in trains, hand brakes must at all times on descending grades be set on the rear cars, sufficient to prevent the slack running up or bunching. This rule also applies to trains approaching stations or other stops, and, except in emergency cases, there must be no deviation.

"Enginemen of trains consisting of air-brake and non-air-brake cars will, by the use of the air-brakes, assist only in making stops, and must whistle "off" brakes, giving the trainmen plenty of time to release the hand-brakes before the air-brakes on the head end of train are released. They must exercise good judgment in using steam while the hand-brakes are set on the rear of the train, in order to prevent the train parting.

"The engine vacuum brake must not be applied (except in emergency), unless the slack of the train is taken out either by the application of air-brakes from the engine or of hand-brakes from the rear."

Mr. Nichols, in a letter published December 17 of the same year, replied to an editorial in our November 19 issue, wherein it was pointed out that Mr. Nichols' rules were in direct variance with what was considered the best practice by such bodies as the Master Car Builders', Master Mechanics' and Air Brake Associations, as well as by the Westinghouse Air Brake Company. All of this is recalled by Mr. Nichols' discussion of this same question in the September Proceedings of the St. Louis Railway Club; he evidently has not changed his opinions and gives some recent statistics in support of his position. He said in part:

We simply claim that if our rules are observed, while trains may break in two or even get together, there is not going to be very much damage done, and our claim is borne out by statistics which we keep. We have recently been hauling 80-car trains out of Blue Island. It is about a 30-ft. grade out of there for a distance of eight miles. From that point to Joliet is about seventeen miles—ten miles down hill and the balance might be termed hogbacks, up and down. We recently took a train of 71 cars—43 loads and 28 empties, 1,735 tons—and before we tipped down this ten-mile hill I had the brakeman set four brakes on the rear end. There was a link and pin coupling 27 cars from the caboose. I walked over to that to see how the slack was. It was taut, and the train moved down that hill the same as though it was one car. The engineman worked steam a little all the way down, and there was not a jar or jerk in the train for that distance of ten miles. We handle 80 cars on that track and do not have a bit of trouble, because we do not allow the slack to run up, but catch it before the train is on the down grade.

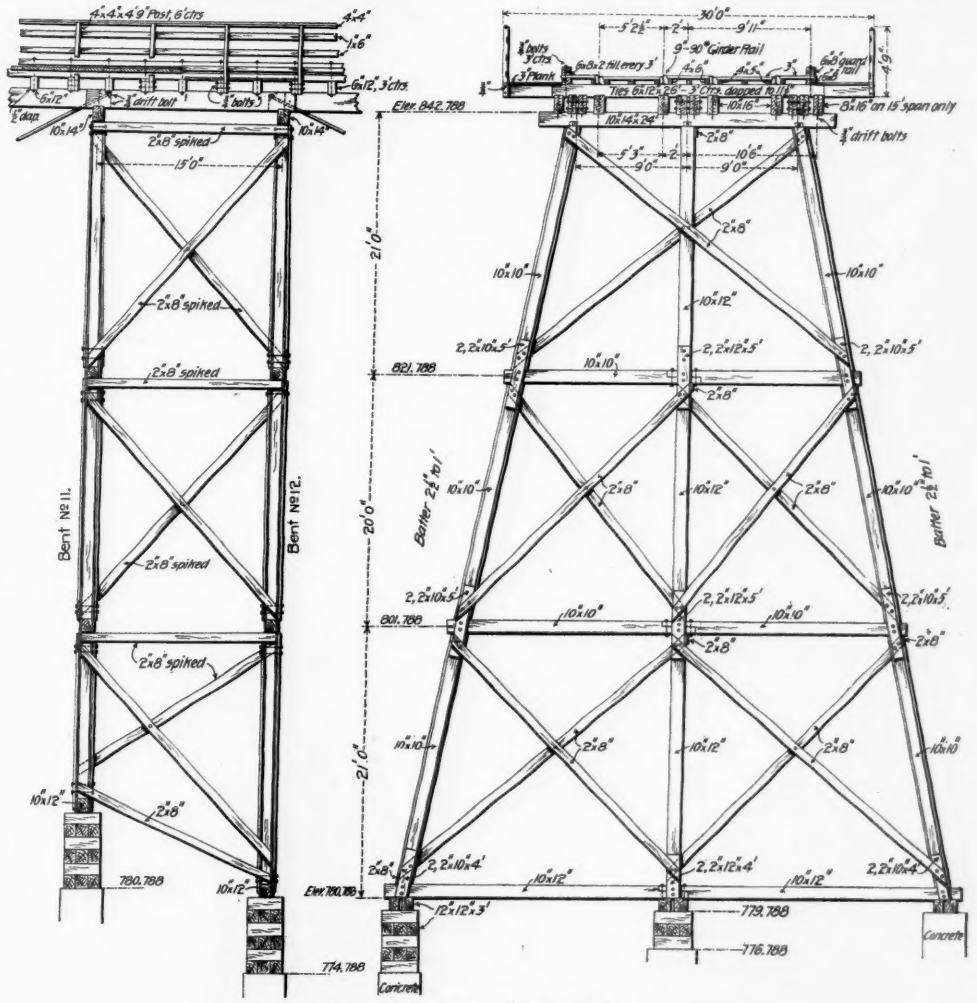
During the month of July, 1898, we handled on the entire system 6,503 freight trains, and had 40 cases of break-in-two, but there was not a dollar's worth of damage done. The causes of the break-in-twos were:

Defects in drawbar gear	4
Broken pins	8
Broken links	1
Ordinary pins worked up	2
Knuckles opened	10
Lockpins worked up	8
Knucklepins worked up	6
Drawbars pulled out	1
Total	40

Of these 33 occurred while trains were running between stations; one case in train stopping for station, defective drawbar, 45-car train, drawbar broke on the thirty-third car in train; five cases in starting trains, evidently the fault of engineman in starting trains a little hard; one case in switching. You will notice in these 40 cases, 24 were due to defects in vertical plane couplers.

In November, 1898, there were 7,421 trains run on the entire system, with 54 cases of break-in-two, as follows:

Thomson Run Bridge—Monongahela Street Railway.



Detail of Bent—Thomson Run Bridge.

Defects in drawbar gear	7
Broken pins	16
Broken links	1
Ordinary pins worked up	1
Knuckles opened	13
Lockpins worked up	9
Knuckiepins worked up	6
Outsiders pulling pin	1
Total	54

Of these, forty-five occurred while running between stations; two in stopping, one caused by drawbar breaking off on account of pinhole giving out, and one case of a double-header, pin broke behind second engine, 36 cars in train; six cases in trains starting. In this you will note 28 cases out of the 54 were chargeable to vertical plane couplers—over 50 per cent.

During February, 1899, out of a total of 9,596 trains run there were 46 cases of break-in-two, as follows:

Pins breaking	14
Lockpins working up in some cases and breaking in others	27
Knuckle breaking	1
Drawbars pulling out	4
Total	46

We do not for a moment pretend to say that we know it all, and it is a matter of indifference to us whether other roads adopt our rules or not. We are simply satisfied with our own results and we are willing to stand on our records. We think that the rule is all right, and until something else can be brought to our notice that will prove better, we are going to stick to it. While the Illinois division of the Rock Island is comparatively level, we have other divisions on the system where it is a pretty rocky piece of road to travel for trainmen, and the tests made were on those divisions where we have the bad track. Our rule is simply the result of practical tests made by our Superintendents, for our mechanical department put themselves on record as being flatly opposed to this rule. They were brought around to it after they saw it tried.

A portion of the discussion of the report, "Breaking Apart of Trains," presented at the last meeting of the Air Brake Men's Association covered this question, and the position was taken that rules, such as those of the Rock Island, did not conform to good practice. It may also be said that a number of the speakers had that road in mind, and their remarks apply directly to the Rock Island rules. The following are extracts from that discussion:

Mr. Paul Synnestvedt (Patent Attorney and Air Brake Specialist).—There has been some discussion recently in which the position was taken by a certain railroad official that the hand brakes should be used on the rear end, to hold out the slack in a mixed train. I think it behooves this Association to go on record in disfavor of that plan because it will do lots of damage if such an order comes from an operating officer of a railroad.

Mr. H. C. Ettinger (Wabash R. R.).—I would say that the question of using hand brakes on the rear end came up before our Superintendents six or eight months ago, and was thoroughly discussed. They adopted the rule that no hand brakes should be set on the rear of the train, and it resulted in reducing the break-in-twos 60 per cent. I think this Association should go on record as adopting that rule, because there are to-day a great many men in the transportation department who still insist on the hand brakes being set behind.

Mr. L. H. Albers (Lake Erie & Western).—When I went with the Lake Erie & Western about eight months ago, a part of the trains were handled with the hand brakes on the rear end and on the caboose. Some of these men would say that they had markers all along the road and knew just when to use the caboose brake. We kept an account of the conductors on the road, as to just which men used the caboose brake, and also kept an account of the conductors that never used the caboose brake. After figuring it out, we found that the most trains were broken in two by the men using the brakes on the caboose, in a proportion of about 75 per cent. Since I have been on that road, I have instructed the men never to use the caboose brake, except in the case of a break-in-two.

Mr. S. J. Kidder (Westinghouse Air Brake Company.—On one very prominent road some two years ago, it was the rule to require the brakes to be worked at both ends of the train. I think that road is responsible for most of the trouble that has occurred in other parts of the country in adopting that idea, because to my knowledge, quite a number of railroads asked for information and received from those parties very favorable replies regarding the method of handling trains with air and hand brakes jointly.

I had a talk with the General Manager of that road, and he was confident that that was the only proper way to handle trains, and he answered every question to the effect that the result was satisfactory. I found upon investigation, in talking with the conductors and enginemen, that they would tell you quietly, and request you not to say anything about it, that they did not have any brakes set on the hind end of the train. When asked why they did not follow instructions, they would go into detail and attempt to state the troubles which came from following instructions. And so, as a matter of fact, they were not doing that way at all. A number of railroad officers have been tempted to adopt the plan, while, as a matter of fact, the information from a reliable source shows that the men are not carrying out instructions, while the General Manager and officials think the good results are obtained from that practice.

The Boston Elevated.

Another portion of the new Boston elevated structure is practically completed. This is at Washington Street just south of the Boston & Albany cut, and is the first section of the elevated lines in the Roxbury Division. The other finished portion is at the Charlestown draw-bridge and approaches.*

The section just finished is more sightly and rigid than any of the others, and is much higher, being up to the level of the third and fourth story of adjoining buildings; thus affording more light underneath and less combined noise to the street.

Some four weeks ago this iron work was started, and already 15 bents have been erected. The progress has been quite rapid, notwithstanding a few delays have occurred in the delivery of material. It is expected that this work will continue without interruption to the Roxbury terminal at Dudley Street.

Owing to the large traffic and danger attending the work on Washington Street, the large members are hoisted in place between midnight and 6 o'clock in the morning. All lighter work, as riveting, is continued through the day.

Some masonry abutments and inclines from Dudley Street to the overhead terminal structure are also nearing completion. The iron is being supplied by the Pencoyd Iron Works. The next section of the elevated structure to be erected will be at City Square, Charlestown. This will join with the section at the draw-bridge described in our issue of July 7 last.

The Atlantic Avenue Division will connect the Roxbury and the Charlestown divisions, and work of building piers here has already been begun at the South Union Station. Before next summer this will be completed. It is perhaps the most difficult piece of work to be undertaken, owing to the soil and the old buried wharves.

Nothing will be done towards the building of the large power house at Lincoln wharf until the summer traffic in that vicinity is at an end.

Sept. 27, 1899. E. M. S.

The Sargent Company's New Foundry.

The removal of the Sargent Company's foundry at Fifty-ninth and Wallace Streets, Chicago, to a new site at Chicago Heights was noted several weeks ago, but at that time only the general features of the new plant had been decided on. The old works include an open-hearth steel plant, a crucible steel plant and an iron foundry. About the first of January with the completion of the new plant, the iron foundry department will be removed to Chicago Heights, the crucible steel plant dismantled and the Fifty-ninth Street works will be used only for making open hearth steel castings. In the new plant there will be two main buildings, parallel to each other and separated by a court 40 ft. wide, and these buildings will be connected at the north end by a cleaning room, while facing the court on either side will be store rooms for foundry supplies; the core room will be adjacent to the cleaning room. One of the main buildings will be used for a steel and the other for an iron foundry.

The steal foundry building will be of brick, 200 ft. long with one clear span of 50 ft. and a 30-ft. annex, making a total space of 80 ft. by 200 ft. The 50-ft. floor will be served by two 15-ton Shaw electric traveling cranes with 3-ton auxiliaries and a number of air hoists. Inside the melting room, which is located at the north end on the court side of the foundry, will be placed two 60-in. cupolas, the blast for which will be obtained from a large fan driven by an electric motor. Just opposite these cupolas in the foundry building proper will be three Tropenas converters, each with a capacity of two tons, and these will be turned by special gear; the blast for the converter at pressures up to 4 lbs. being furnished by a Roots' blower, geared to a 50-h.p. electrical motor. The Tropenas process, for making small steel castings and castings for electrical and other work formerly made of crucible steel, was adopted after an investigation of European methods. This process makes use of a special converter invented by Alexandre Tropenas, and is used to a considerable extent abroad.

The iron foundry will have a capacity between two and three times that of the Fifty-ninth Street plant, and will be used exclusively for casting brake shoes. It will be 200 ft. long, with a clear floor space, 80 ft. wide. The cupolas, one 60-in. and one 72-in., will be placed in the melting room on the court side at the south end of the foundry and eight pneumatic molding machines will be placed in line lengthwise of the foundry and on the side opposite the melting room. The molten metal will be carried lengthwise of the foundry in a large reservoir ladle, traveling on a narrow gage track; from this ladle it will be delivered to bussy ladles, each operated by a single man, which are wheeled back and forth to the molds over the iron plate floor. This system of pouring has been used for a number of years in the Fifty-ninth Street works with considerable success; the pouring gang is continuously employed at this work during the entire day. This department will have a 5-ton power jib crane and a number of air hoists. The blast for the cupolas will be obtained from fans driven by electric motors.

The core room and cleaning room will be located so as to be equally convenient to each foundry, and will be fully equipped with rattlers and emery grinders, all driven by electric motors. Castings after being finished in the cleaning room are to be loaded directly into cars standing on a depressed track, which runs the length of the room, 200 ft. All foundry supplies, such as molding sand, limestone, coke, clay, etc., are to be delivered in cars on stub tracks entering the court between the buildings. Pig iron and scrap will be piled beside the track in the yard but a short distance from the cupola elevators. There is ample space on either side of each foundry for the storage of flasks.

The power house is to be separated, but, like the other buildings, will be entirely of brick and stone, 52 ft. x 108 ft. 7 in. In this building there will be two 72-in. horizontal tubular boilers 18 ft. long equipped with special rocking grates and blowers, together with two large feed pumps and a 300-h.p. feed water heater. In the engine room will be located an 18 x 42 in. girder frame Reynolds Corliss engine, built by the E. P. Allis Company, a 150-k.w. generator built by the Western Electric Company, and a 100-h.p. duplex compound air compressor. A separate switch track is to be provided for bringing fuel supplies to the power house. The whole plant is so designed as to permit of its capacity being doubled, as it is expected that the open hearth steel department will eventually be removed from Fifty-ninth Street to the 10-acre lot adjoining the new Chicago Heights plant on the north. The iron foundry and the Tropenas steel foundry are also laid out so that the capacity of each can be doubled by extending the buildings to the south, and without interfering with the system of handling the raw and finished materials.

* See Railroad Gazette July 7, 1899.

A Long Distance Electric Railroad.

A new electric railroad is to be built in Northern Ohio to connect the city of Toledo with Norwalk, about 60 miles, across a rich and prosperous country. On the line of road lie eight cities and villages, Fremont being the largest of these, others such as Woodville, Belleville and Monroeville being towns of considerable size. This railroad is to be built under the plan adopted for the Detroit, Ypsilanti & Ann Arbor and for some other recent enterprises of a similar kind; that is, Messrs. Westinghouse, Church, Kerr & Co., engineers, have acted as engineers and architects in designing the system from the ground up, covering track, power station, rolling stock and in short everything, and they have taken the contract for carrying out the work.

The road will be built according to good steam railroad practice and designed for a speed of at least 40 miles an hour.

One striking fact is that this line of 60 miles will be worked from one central power station to be established at Fremont. A three-phase alternating current will be used which will be transmitted each way at a high voltage.

In the power station will be five 300-h.p. Babcock & Wilcox boilers, with Roney stokers and machinery for handling coal and ashes. Two 4,000-h.p. Worthington, elevated, jet condensers will be used, and the Westinghouse mechanical draught and economizer system will be employed to heat the feed water and secure the proper draught, and the feed water will be purified before being delivered to the boilers. Exhaust steam from the auxiliary engines will be used to heat the feed water on its way to the economizer.

Four Westinghouse, Columbian-type engines, direct connected to 500-k.w. Westinghouse, engine-type, three-phase generators, will be used. Two 9-in. and 15 in. x 9 in. Westinghouse compound engines will be direct connected to two 30-k.w. exciter generators.

Six sub-stations will be established about equal distance from each other along the line, with a seventh in the power house at Fremont. The current will be transmitted at about 15,000 volts, and stepped down and transformed at the sub-stations. At each sub-station will be three transformers and two rotary convertors with the necessary switchboard and controlling apparatus. We are told that the use of this high-tension transmission will permit a saving of over $100,000 in the cost of copper wire alone.

The projectors of this enterprise look forward to spur lines as feeders, and to extension of the line from its immediate termini both east and west.

Two Mills per Ton-Mile.

[President Ashley in the Wabash Report.]

An impartial view of the conditions of railroad property encourages expectations of much more satisfactory results from the large increase of traffic than in recent years. Rates for the transportation of freight continue lower, and show a reduction per ton-mile, as compared

with 1898, but the more active employment of all the machinery of transportation has led to greater stability in established rates, and, in this respect, the situation is more favorable. It is, nevertheless, a conspicuous fact that railroad freight is carried in immense volume at unnecessary sacrifice, in consequence of competitive struggles which no influences can reach, and for which Congress, in its wisdom, refuses to provide a remedy.

The time will come, perhaps, when Western railroads, like those of New England, can afford to ignore unprofitable freight, and depend upon the passenger traffic of a dense population; but this is a slow process and a deferred hope.

The movement of freight from the West to the seaboard, at the rate of two mills per ton-mile, has recently excited the wonder of intelligent men that such a rate can be established and pay a profit to the transportation agencies. The error into which the observers are led by this statement is easily explained. The average rate per ton-mile, for example, on the Wabash lines for the last year was 5.53 mills, against 6.24 mills for the previous year—a reduction of .071 mills, or about three-quarters of one mill per ton-mile. Now, while grain and coal, and other freight of lower classification, may be carried at two mills per ton-mile, the higher classes of freight pay much better rates, and the average is thus obtained. While, therefore, the low rate quoted is made practicable by the higher rates obtained on first class freight, it is doubtful if the rate of two mills per ton-mile, of itself, would pay the cost of transportation, not to mention the wear and tear of track and machinery. The average cost of moving freight on the Wabash in 1898 was 4.47 mills per ton-mile, and, in the last fiscal year, 4.21 mills. It is safe to say that no railroad in this country could reduce its average rate to two mills per ton-mile without going into bankruptcy soon afterward. At two mills per ton-mile, the Wabash would have lost in the year 2.21 mills per ton-mile, which, on the tonnage of 1897-8, would have figured up a loss of about $3,020,000, or nearly as much as the entire net earnings of the company applicable to interest. It is interesting to note in this connection that the reduction of .071 mills per ton-mile in the rates of the last fiscal year amounts to $1,183,449.33, and is equivalent to that reduction in the net profits of the year.

Diamond Stack Without Netting.

We reproduce herewith drawings of the diamond stack without netting which is in use on the Mexican Central Railway. This stack has been in use on that road three years, and has given excellent results. It was primarily designed to avoid the use of netting across the top of the stack. The life of the netting is comparatively short, and it has to be replaced, while the cone, Fig. 5, and annular casting on top of the stack, Fig. 4, are practically indestructible. With this stack the throwing of fire is effectually prevented, and though it is used principally on wood burning locomotives, still it is applicable to those burning coal, and equally good results are obtained.

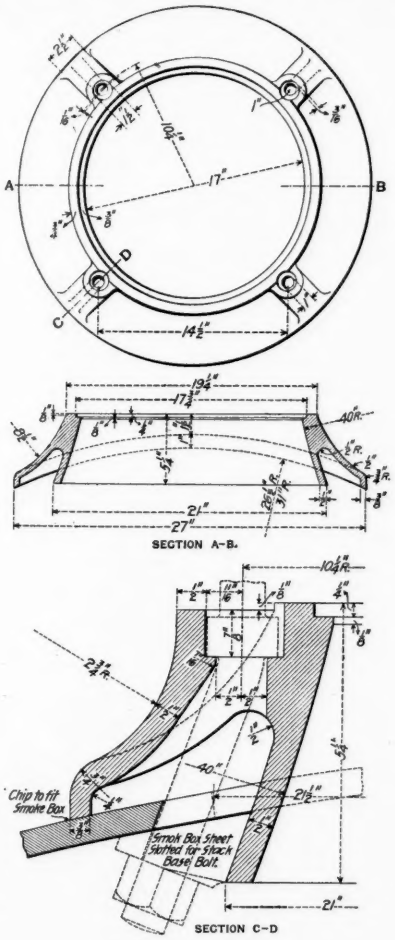


Fig. 2.—Stack B se.

Fig. 1 shows the stack as applied to wood burning locomotives. It can be seen from this drawing that the use of deflecting plates and netting in the front end is avoided, and for coal burning locomotives a similar arrangement can be employed. The base of the stack, shown in detail in Fig. 2, is the same as that used with straight stacks, and the matter of interchanging the stacks is only a question of removing the upper nuts of the base bolts and applying the stack desired. The base is made with two different radii on the lower portion, which is also provided with a chipping strip, and can be fitted to all classes of locomotives except the largest consolidations which, on account of the large diameter of their front ends, a different construction is desirable. By the use of a collar bolt on the base, studs and rivets are avoided, and the stack can be detached without disturbing the base.

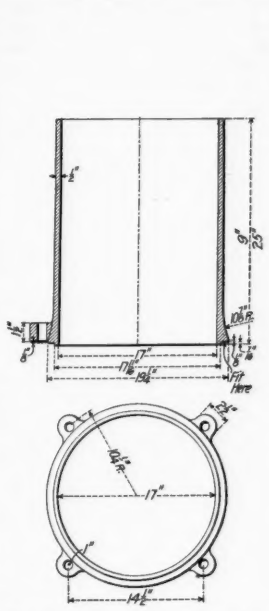


Fig. 3.—Barrel of Wood Burning Stack.

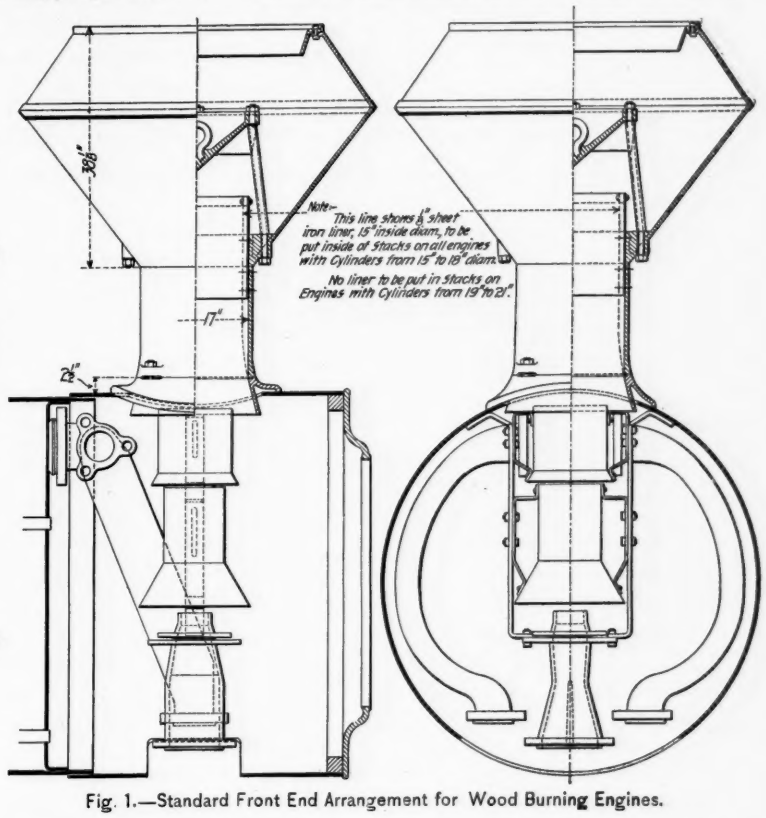

Note—
This line shows 1/8" sheet iron liner, 15" inside diam., to be put inside of Stacks on all engines with Cylinders from 15" to 18" diam.
No liner to be put in Stacks on Engines with Cylinders from 19" to 21".

Fig. 1.—Standard Front End Arrangement for Wood Burning Engines.

The barrel of the stack, Fig. 3, is made of the same diameter for all engines, the length varying in order to secure the proper height above the rails. A difference in the internal diameter is made by introducing a sheet iron lining when used on locomotives whose cylinders are from 15 in. to 18 in. in diameter. The diamond top shown in Fig. 4 is made in two parts which are held together by a 1¼ in. angle iron hoop bent to the angle of the top and held by the clamp shown. The lower half has the same diameter as the barrel, and a $\frac{5}{16}$ in. plate bushing is put in and riveted both to the barrel and the top. Inside of this top is placed the cone, Fig. 5. This is secured by four ⅞ in. bolts and its height is adjusted by 1 in. gas pipe thimbles through which the bolts pass. This is clearly shown in Fig. 1. On the under side of the cone are wings or vanes which give a rotary motion to the current of air, and serve to break up and extinguish the sparks. On top of the cone is a wrought iron ring cast into it, and which serves to attach a chain to lift the stack. On top of the diamond is an annular casting which is bolted to it and projects down into it. This serves also to retard and extinguish the sparks which pass the cone. The base, barrel, diamond top, cone and ring are all of cast iron, and with the exception of the base the same patterns serve for all classes of engines.

On the Theory and Practice of Getting Jobs.*

J. W. Alvord, M. Am. Soc. C. E.

In recently looking over a mass of pamphlets in one of our Society libraries I became impressed with the lack of attention to the very practical subject which I have chosen as the title of this paper.

It is a cause for congratulation to note the completeness and care with which professional brethren have been willing to lay before us, in all possible detail, the methods which they have adopted, the researches which they have made, and the conclusions to which they have arrived after long and laborious study, in the performance of jobs which they have already secured, but of the important and interesting problem, how to obtain such jobs, such writers are usually more than modest, and if perchance they hint at that phase of the subject at all, it is with the lightest and airiest touch or the breathing of some such unsatisfying and elusive ritual as: "The committee having placed the matter in my charge," or "being consulted by the president of the company," or to use a still more common and unsatisfactory expression: "The writer being called in at this juncture to undertake the work," etc.

I have enjoyed reading such phrases as these for many years. They appeal to my imagination. In my mind's eye I could see a committee of solid and influential citizens after long and profound consultation coming to my professional brother's office in a body and solemnly almost, one might say, reverently "placing" the matter in his charge unreservedly and fully, and with that simple and childlike confidence that in so doing they had by that one act fully insured the brilliant success of the proposed undertaking.

Or again, my imagination has pictured the aged millionaire president asking for a consultation on some of the problems presented by the works, and gravely appearing at the office of my fortunate brother engineer at the appointed time followed by his own engineer with roll of plans, and patiently waiting his turn for admission. Nor have I failed to catch the inspiration afforded by the seductive phrase, "Having been called in at this juncture."

*Extracts from a paper presented at the fourteenth annual meeting of the Illinois Society of Engineers and Surveyors.

Fig. 4.—Standard Wood Burning Stack on the Mexican Central.

Fig. 5.

In the course of years of expectancy and yearning for jobs and more of them, such delightful experiences as these have been somewhat few in my own career, and when the remotest similarity to the examples given have actually occurred, the experience has left me in a stunned condition of mind. In earlier years I naturally felt with humility that I was only clinging to the outskirts of the profession, hanging on to its extremities, as it were, and when I lost my first important salary and tried to get another, I felt a good deal as a cat does when thrown out of an upper window, and goes down with a rush, clawing, yowling and grabbing at everything in sight in vain attempt to ease the situation. The inability at that time to get my claws into anything tangible made a serious impression on me, which has only deepened with the lapse of time and the accumulation of experience.

Who has not observed in the midst of the struggle for existence the cheering influence of these passing greetings with our fellow engineer, especially with a rival in our own line of business, "Hello, Jones, how goes it?" and then Jones grasps your hand and leads you to the curbstone and pours into your ears a glittering story of majestic success he has had of late; how he was chosen among twenty applicants at "Three Corners;" what the mayor of Gingerville had said of the successful test of his latest water-works. How busy he was and how much work he had been obliged to refuse recently. Quite the opposite in character are the men, young for the most part, who confide their disappointments to the correspondence column. These letters from young men who have failed and tell about it, always fill me with great interest. We are all familiar with their treatment of professional ethics. They have been degraded by being forced into a competition by callous and unfeeling boards who give no thoughts to the advancement of the engineering profession at all, and after the applicants have named compensation (and possibly failed to verify their qualifications) they have been subjected to the mortification of seeing their professional knowledge weighed up and measured like a lot of hay or potatoes, and perhaps found wanting. It is indeed a cruel experience, this having the cold outside world size up our professional attainments instead of taking our own measure of ourselves for comparison, and the hard cruel fact that these worldly and greedy trustees are looking for the largest knowledge for the least money, comes upon a sensitive and confiding nature like the blighting breath of a simoon upon a gentle flower.

Far be it from me either to suggest that such mournful stories are not often, too often based upon sad facts. Indeed, should I take occasion to doubt them, I am too often reminded of a worthy old uncle of my own who had conquered a living with arduous toil for many years among the rugged hills of western Connecticut. Upon a visit to him I confessed blushingly from time to time my many triumphs over the forces of nature. The old gentleman eyed me suspiciously for a day or two in the evident attempt to determine my species, and finally asked confidentially: "Now isn't this engineering business a kind of fancy business anyhow?"

At this particular point I desire to contrast the theory with the practice. You open an office and insert your business card in the technical papers. Then you brace yourself for the flood of business. Your professional rivals drop in one by one to ask "how it comes on," and incidentally to see how much your office furniture cost you, and otherwise assure themselves that you are not yet likely in the remotest way to get a job away from them. A few book agents vary the monotony of life, and once and a while a well-dressed life insurance agent makes your heart jump into your mouth as you lead him into the inner office with every nerve braced to keep the joy out of your face and assume a bored and indifferent air. I know of few more trying, soul-wrenching moments than come with the disclosure of the life insurance man's business in that inner sanctum. It is for this, then, that those pumping engine details have been scattered over the table, and books on deep and abstruse subjects placed where they meet his eye. A man who can pass through these experiences without the freshness of his hope being perceptibly withered has fitted himself for a better land.

But yet the theory seems to be all right. You are a professional man. Your work is such as to require confidence in you on the part of your clients. Consequently it is indelicate on your part to push your claims to their notice. You feel competent to do their work. You have done it before over and over again successfully, but you must not intrude this fact to their notice, but wait for them to come to you.

These are the conclusions I have been led to after long years of perusal of engineering literature. I take delight in the theory. It accords with my own sensitive nature and my retiring disposition. I always read articles on the "Standing of the Engineer" and "Ethics of the Profession;" I am especially fond of "Presidents' Annual Addresses," I consider them delightful reading. I well remember seven years ago returning from a $75 trip to Braceville, where I had been at my own expense, to see another engineer receive a job, being much comforted by reading the annual address of our worthy President. It seemed to relax the strain of the Braceville episode to read of the great achievements of the engineer along the different lines of his profession throughout the world, and to know once more that his was the opportunity to "harness the forces of nature to the uses of man." I have been familiar with that sentiment for many years, but it never seemed to have the same weight and swing as it did on this occasion. It calmed my nerves and filled me with a glow of hopefulness. I felt once more a man. I think we cannot set too great a store on these presidents' addresses.

It may be inferred from my reference to the Braceville episode that I have sometimes gone out after jobs. It is with some reluctance that I am compelled to admit here, confidentially, that once or twice I have "run over" to a town or two to see if there was any interesting and instructive work going on. I very well remember the first time I did this. I thought it a little singular that I should find near the bait the plain footprints of several distinguished professional brethren versed in that particular specialty. Some of them, I was told, had "stopped over" on their way to important work at other points further on. Some had been invited by a particular friend who was extremely anxious to see the important work in the proper hands. Nearly all happened to have, fortunately, with them some copies of testimonials of former work which they would leave. The engineering of this particular job was finally let on proposals. I remember that at the letting several of us who happened to be in town were interviewed by the council one by one behind closed doors, sized up, so to speak.

I also remember while waiting for my turn to trot, being called aside by a mysterious man with a wandering eye and a sinister smile, and being informed in a highly secretive manner that the firm of Tripod & Sight-pole had three of the council for them, and there would be no show for me unless I would leave the matter with him, that he had a good deal of influence with the council and wanted to see me get that work. I remember being much touched by his sympathy and solicitude in my behalf, and saying to him earnestly that if awarded the work I would endeavor to do it well and faithfully, together with much more in the same strain, the net result of which, much to my surprise, seemed to cool his interest wonderfully. I noticed afterward that Messrs. Tripod & Sight-pole got the work, and I remember particularly being struck with the fact that there was a difference of some 3,000 per cent. between the highest and lowest bid. It is natural to abuse the wily councilman for his lack of appreciation of engineering ability, but it is hard to see how he can form a very high opinion of a profession that has such a variable estimate of themselves.

After my arrival home, I watched eagerly for next week's technical papers. Now, thought I, we will have this disgraceful competition exposed by an able editorial on "the folly of treating brains as merchandise," or "low depths of ignominy to which some town councils are sunk." I was disappointed; after searching vainly all through the news column, I found the following brief item in the next issue: "The services of Messrs. Tripod & Sight-pole, the well known engineers of Metropolisville, have been secured by the city of," etc., etc.

After this my confidence in the theory of getting jobs began to wane. I laid the theory on the shelf, as it were, and found myself compelled by urgent necessity to discover the practice. In the course of a number of years of heartrending experiences I have, I think, discovered a few simple rules for getting jobs which, after much reluctance, I have concluded to give to the profession in absolute confidence. They have not always worked as well as I would like, but they at least give one a fair chance with other professional brothers, and they are as follows:

1. Find your job.

This is quite necessary. I have completely discarded the theory on which I started in, that your job should find you. It may work once in a while, but as a rule a needy engineer out of work is a great deal keener hunter than a lonesome job is. After you have found jobs for a good many years it is possible that some stray jobs may find you, but I wouldn't count on it.

2. Know a great deal more about how that job ought to be done than anybody else around.

There is no doubt at all but that this is a very important requirement indeed, in the practice of getting jobs, but it is one which I feel almost ashamed to mention, and indeed would have foreborne to speak of had it not been that occasionally I have met enthusiastic and confident engineers eager and willing to lend a hand in the great work of harnessing the forces of nature, but a little uncertain as to the difference between the breeching and bellyband. This delightful trait of ambition in our profession should be commended, could it only be turned into proper channels, but the greatest problem we have is how to direct the energies of such would-be members into ethical discussions on the standing of the profession or society resolutions upon the unsatisfactory condition of the remuneration of engineers.

3. Know the men who have the jobs to give.

This last rule seems also to be one of those delightfully simple propositions in theory which are found so difficult in practice. The theory of the thing is that an engineer's reputation ought to precede him everywhere. In practice he is usually exceedingly glad if it will only follow him at a respectable distance.

People with jobs to give want to see you, poke your ribs, and put you through your paces, as I have elsewhere intimated. And if you would like to be their "hired man" it is best for you to go and submit yourself to the process as gracefully as you can.

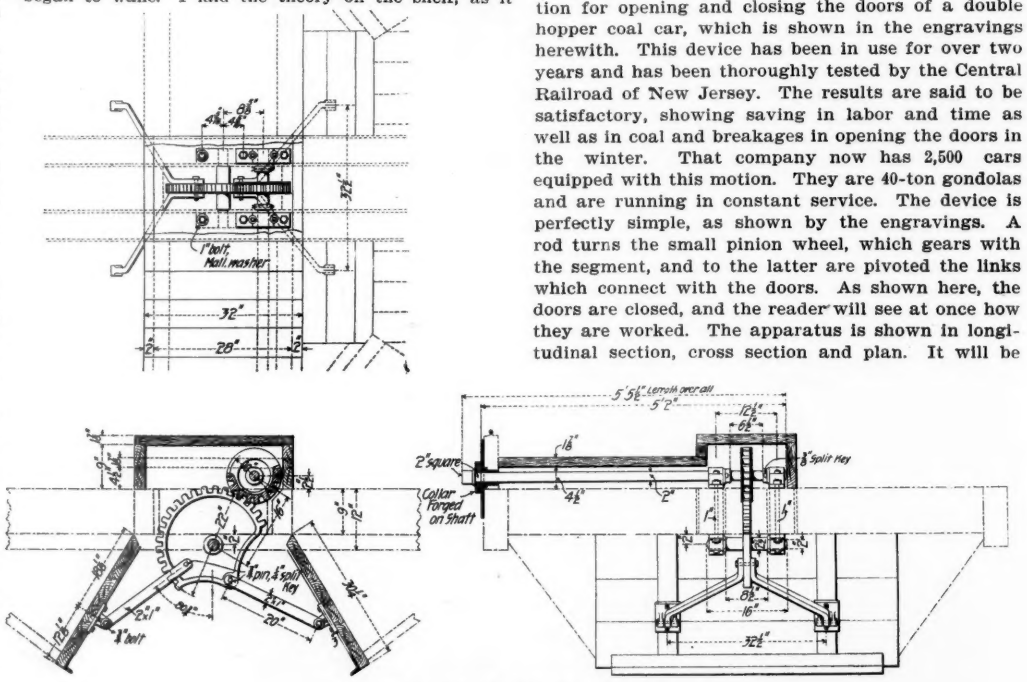
I believe, however, that it is quite possible to do all this and still be modest. There is no money in being bashful, but to be suitably modest at the proper time and in the proper amount is an art whose worth to the fortunate possessor cannot be overestimated.

Long years of harrowing experiences have frayed the edges and removed the bloom from my own early attempts to be modest. Yet I can not refrain from referring with pride to one attempt which may prove instructive. In the first year of my apprenticeship the city directory man called at the office in which I was engaged and asked for my name and designation. Naturally I did not feel at that time that I stood more than upon the threshold of our great and noble profession, so I informed him simply that I thought I might be entitled to be called an "engineer's assistant." I am at a loss to determine even to this day whether this was an act of true modesty or mere bashfulness, but this classifier at the central office of that directory had evidently no difficulty whatever in placing me. He had met pretentious people before in his line of business, and when the directory was duly printed and issued I was dumbfounded to observe the appellation of "fireman" following my name and address.

It is pretty evident that the business world makes but little allowance for ordinary modesty, but it doubtless has distinct difficulty of its own in designating and classifying a profession which expects a man to drive stakes in a sewer or paint landscapes in the office, corner the elusive bacillus in the laboratory, or throw off a literary gem in the shape of a financial prospectus between meals.

The Barney Coal Car Door Rigging.

Mr. Nathan Barney patented May 25, 1897, a motion for opening and closing the doors of a double hopper coal car, which is shown in the engravings herewith. This device has been in use for over two years and has been thoroughly tested by the Central Railroad of New Jersey. The results are said to be satisfactory, showing saving in labor and time as well as in coal and breakages in opening the doors in the winter. That company now has 2,500 cars equipped with this motion. They are 40-ton gondolas and are running in constant service. The device is perfectly simple, as shown by the engravings. A rod turns the small pinion wheel, which gears with the segment, and to the latter are pivoted the links which connect with the doors. As shown here, the doors are closed, and the reader will see at once how they are worked. The apparatus is shown in longitudinal section, cross section and plan. It will be seen that the gearing occupies but little space above the floor level of the car in the middle.



The Barney Rigging for Coal Car Doors.

The company controlling this device is the Automatic Coal Car Door Co., 120 Broadway, New York, of which Mr. Henry W. Hayden is Secretary and Treasurer.

Gas Engines—Am. Soc. Mechanical Engineers.

The monthly meeting of the Society, under the direction of the Juniors, which was held at 12 West Thirty-first Street, New York City, on Tuesday evening of this week, was largely attended. Mr. Henry B. Longwell, of Westinghouse, Church, Kerr & Co., read a paper accompanied with lantern slides, in which he gave some particulars of the Westinghouse gas engines and showed on the screen the more important details. It is hardly necessary to attempt an abstract of his paper as the more important features of the engine he described were shown in our issue of Sept. 15 last. Mr. Longwell, in a very entertaining way, gave many important facts regarding the design of gas engines, and called attention to the many good points in the designs as worked out in this engine.

It may be remarked that the Westinghouse engine is probably the only one that makes impulses of uniform frequency for all loads, whereas in a single cylinder "hit and miss" engine, when running under maximum load the impulses may be as frequent as one for every two revolutions of the crank, while under light loads the impulses may be as infrequent

as one to every 10 or 12 revolutions of the crank. In thus departing from what may be regarded as an established design, Mr. Longwell believes that the Westinghouse engine has contributed something to the art of gas engine building. He spoke of the problem of the proper control which had been so successfully solved in the Westinghouse engine, and also referred to the little or no trouble from a noisy exhaust. When running it sounds more like the puffing of a steam engine than do most gas engines.

The oil used is of moderately high fire test, and all lubrication in the cylinder comes from the splash of the crank in the bath of oil. The governing apparatus is arranged so as to make it possible to determine accurately the best proportions of air and gas to use.

This company makes also what is called a gasoline engine; but actually in this engine a gasifier supplies a rich gas of uniform quality obtained from gasoline; but, as noted in our issue of Sept. 15, this gasifier is in no sense a carbureter. Any gas engine built by the Westinghouse Company can be adapted for using gasoline, while on the other hand any gasoline engine can be easily fitted up so as to use natural or illuminating gas by simply substituting suitable pistons.

Reference was also made to the 1,500-h.p. gas engine now being built by the Westinghouse Machine Co. Mr. Longwell stated that from present experience it could not be said that a limit to the size of the engines would probably soon be reached. The 1,500-h.p. engine will have cylinders 34 x 60 in., the extreme length will be 44 ft., width 12 ft. 4 in. and height 27 ft. The 650-h.p. engine which is now being used in the regular service at the works of the Westinghouse Electric & Manufacturing Co., is the largest ever built. This is working successfully and takes care of wide variations of load which jump from 100 to 500 amperes, and governs these fluctuations without any difficulty. Those interested will find considerable information regarding this engine in our issue of Aug. 5, 1898.

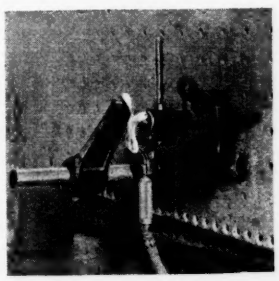
Additional information was brought out in the discussion, a number of questions being asked Mr. Longwell which brought forth replies making clear many of the details of the engine.

Tests on one of the 125-h.p. engines using Pittsburgh natural gas as the working fluid showed the following results: When overloaded and indicating 141.3 h.p. the gas consumption was 9.9 cu. ft. per brake horsepower. When running normal at 122 h.p. the consumption was 9.75 cu. ft., and when running on half load at 63.8 h.p. the consumption was 12.7 cu. ft. For illuminating gas the consumptions would be about one-third more than for the natural gas. Such results as low as the above would have been regarded as very remarkable but a few years ago.

The next monthly meeting will be held on the first Tuesday of November at the house of the Society, when the subject of compound locomotives will be discussed by Mr. Fred H. Colvin.

A New Air Drill.

The Standard Railway Equipment Company of Chicago and St. Louis is putting on the market a new design of pneumatic drill, known as the monarch piston air drill No. 1. This drill has ball bearings throughout and has a solid three-point crank made of tool steel, hardened where the bearings of the various ball races are, each bearing being provided with two ball races. The makers claim that this is the only drill on the market that has a solid tool steel crank hardened and provided with ball races on the piston and end bearing.



The spindle is on one side of the working parts, making the engine part entirely separate from the spindle and undue strain on the drill cannot affect the engine part. The pinion is of tool steel hardened and all the gears are cut to size and are protected from dust and dirt.

This drill weighs but 32 lbs., and will drill any size hole up to 2½ inches diameter, in any metal. The makers claim economy in the consumption of air and simplicity. The tool measures but 12 in. from end of feed screw to end of spindle and can be used within 3 in. of a corner. Drills will be sent on trial.

Eastern Maintenance of Way Association.

Last week (page 676) we gave a synopsis of the first part of the annual convention of the Eastern Maintenance of Way Association. The first session was called to order Tuesday afternoon, Sept. 26, at 2 o'clock by President Torr. Following the proceedings of the first meeting, as given in our last issue, the subject of the committee report on "How Shall the Right of Way be Maintained in a Tidy Manner with the Least Labor of Trackmen?" was taken up and discussed by Messrs. McManama (Fitchburg), Collins (N. Y., N. H. & H.), Curtis (B. & M.), Lentell (B. & A.), Patch (B. & M.), Bryant (N. Y., N. H. & H.), Haskell (B. & M.), Stickney (B. & M.), Sibley (N. Y., N. H. & H.), Sullivan (B. & A.), Osgood (P. & R. F.), and others.

The commitee report on "The Most Efficient, Durable and Economical Form for Standard Snow Fence; Also Best Form of Wire Right of Way Fence, Giving Size of Wires, Etc.," was next discussed. Mr. Stickney (B. & M.) stated for the committee that the report was made narrow purposely to be supplemented by full discussion. He showed photographs of a snow fence of a form he had built some distance from the track as a wind break, which caused snow to form a drift at a distance from the track and prevented formation in the cut. From his experience the form of fence shown is preferable to barbed or woven wire near large cities. Ordinarily, at points farther out, woven wire is satisfactory. He used chestnut posts, some of which had lasted 20 years; the average life he estimated as 12 years, the life depending on the locality and treatment of posts.

Mr. Patch (B. & M.) disagreed with the committee on the question of woven wire for fencing, having concluded from experience to use only a "nine-wire cow fence," with posts 12 ft. apart. One hundred and fifty rods of such fencing could be stretched at one time, and one could climb over without injuring the fence.

Mr. Collins (N. Y., N. H. & H.) had good success with a tight board fence 5 ft. high, where the land permitted placing from 30 to 60 ft. from the line of road. Like others, he had built fences with old ties set on end in the ground, some of which lasted from 12 to 15 years.

Mr. Patch gave the cost of building woven wire fencing at 75 cents a rod, in place, against 77 cents for the nine-wire cow fence, 20 cents a rod representing the cost of labor.

Mr. Sibley (N. Y., N. H. & H.) stated that the New York, New Haven & Hartford roadmasters recommended a woven wire fence in form resembling the Page fence. For snow, a plain 6-ft. board fence was used.

The second session was called to order Tuesday evening at ten minutes past eight, when the report of the committee "From a Maintenance of Way Standpoint, the Consideration of the Relative Merits of Stone Ballast, or Gravel Sprinkled with Oil" was discussed. Mr. Haskell (B. & M.) had concluded, after two years' experience with oil sprinkled ballast, that from a maintenance of way standpoint, rock ballast was superior to gravel ballast coated with oil. To properly maintain a roadbed, free from dust, he deems it essential to sprinkle with oil every year. During the first year of his experience the Boston & Maine used 4,000 gallons of oil to a mile of double track, and in the second year 1,200 gallons to the mile.

Mr. Patch (B. & M.) recommended oil for laying dust, but had found that when applied to fine sand dust was inclined to fly, and that such dust, being saturated with oil, was particularly objectionable and injurious to clothing.

The report was accepted as read and the question left open for another year.

In connection with the question "Under Existing Conditions Would it not be Economy for Railroad Companies in New England to Treat All Cross Ties Chemically?" the Secretary read a paper in which the following processes for preserving timber were discussed: (1) Kyanizing, discovered in 1832, in which chloride of mercury (corrosive sublimate) is the preservative chemical; (2) creosoting with "dead oil" of coal tar or "pitch oil," first used in 1838; (3) Burnettizing, in which the preservative chemical is chloride of zinc, also first used in 1838. The conclusions reached showed that Carbolineum Avenarius, a combination of creosoting and Burnettizing, was the cheapest and best preservative for timber. Some figures were given to show the difference in cost between ties untreated and ties treated with Carbolineum Avenarius. An untreated pine tie, in track, costs 66 cents against a total charge of 81 cents each for ties treated with Carbolineum Avenarius. The average life of the former is estimated at six and the latter at eighteen years, a difference in favor of the treated tie of .059 cent a year, the annual charge being computed at 4 per cent.

The last meeting of the convention was called to order at 20 minutes past 9 Wednesday morning. The committee report on "What is the Proper Relation Between Weight of Rail and Weight of Rolling Stock? Assuming a Proper Relation Between Weight of Rail and Weight of Rolling Stock, What is the Most Economical Spacing for Ties?" was discussed.

Mr. W. F. Ellis, of Boston, addressed the meeting, illustrating his remarks with some sketches. He called attention to the steady increase of weight of cars and the necessity for heavier rails. He recommended the 100-lb. rail as being in all respects the most economical and as providing for new conditions.

Mr. Haskell (B. & A.) spoke of the 95-lb. rails in use on the Boston & Albany. The width of base is 5½ in. and the height 5 in. Fourteen ties to each 30 ft. are used, the face of No. 1 ties measuring 7 in. and the rail joints supported.

Mr. Curtis (B. & M.) believed in uniform spacing; ties can be laid too close for efficient tamping and economical handling of ballast.

Mr. Ware (B., R. & P.) during the past three years has sent to Virginia, where he buys his white oak ties, an inspector, which has resulted in securing better ties, enabling him to get along with 14 instead of 18, with equal results.

Mr. Clark (B. & M.) stated that he had found a saving in maintenance of line and surface of 33 per cent. from using 75-lb. instead of 56-lb. rails.

Mr. Wm. T. Manning, Engineer B. & O., was elected a member.

Mr. Nichols, of the Pennsylvania, addressed the meeting on the subject of oiling track. In addition to the points mentioned in the report of the committee, he mentioned the fact that oil caused a water proof surface on the roadbed and that track labor is reduced. He had noticed particularly that in places where oil had been used it had prevented loosening of the ties and pumping of the track where the ground had previously been in bad condition from earth softening in the spring. In answer to a question as to whether or not oil made ties more inflammable, so that they were liable to burn, Mr. Nichols stated that while the oil used was combustible at high pressure, it would not readily burn as used ordinarily. In fact, on portions of the track where he had had trouble from ties being burned from live coals dropped from locomotives, the trouble had been entirely eliminated through use of oil on the track, not a single tie having been burned since oil was first used; dust combined with the oil furnished a fire-proof covering. The Board of Health had told Mr. Nichols that after microscopic investigation of dust from an oil sprinkled road they had found no microbes.

Mr. Stickney (B. & M.) said that he had used oil on 55 miles of double track, which had been particularly dusty; the oil penetrated from 1½ in. to 3 in. and proved quite satisfactory; on another portion of the track, where the soil was sandy, the results were to the contrary, the oil penetrating but 1 in. or less, especially where the sand was fresh turned. Mr. Stickney used 2,000 gallons of oil to a mile of single track.

Mr. Nichols replied to Mr. Stickney, stating that he did not think sufficient oil had been used; that the track should have been sprinkled a second time. He had had some experience with sprinkling a roadbed of fine sandy soil, with good results, using 2,500 gallons of oil to a mile of track. He began to sprinkle in the spring of 1898 and the piece of road in question is now practically dustless; the penetration was from 1 to 1½ in., but the entire surface was covered. Care should be used in selecting oil, and it should be carefully inspected. Oil with a specific gravity of .887 is preferable.

Mr. S. Kunisawa, C. E., of the Imperial Government Railways of Japan, addressed the meeting. He spoke particularly of the difference in methods of taking care of tracks in Japan and America. Labor in Japan is very cheap, and it takes a considerably larger number of men to do a given piece of work than in other countries, and no mechanical devices or modern tools are used. Track laborers receive 15 to 20 cents a day, and four section men are employed to every section of two miles each, with a section foreman for every three sections. Mr. Kunisawa expects to change all this by introducing methods similar to those employed in America. The railroads in the northern part of Japan suffer considerably from snow, which sometimes causes a suspension of travel for several days. The roads have no snow plows, and depend on men and locomotives fitted with pilot plows to remove the snow. The island of Nippon is in some parts very mountainous, and the railroads are now trying to solve the problem of keeping the numerous tunnels free from smoke. On a section of track on which the Abt rack-rail system is used, the engine pushes the cars up the incline; the one tunnel on this line is fitted at the lower end with a canvas covering, which is let down as soon as a train enters the tunnel, preventing a current of air from carrying the smoke from the engine through the tunnel and enveloping the train. The rail sections of the Imperial Government Railroads correspond closely to our American Society 60-lb. rails.

The Committee on Resolutions, in its report, thanked the Casco Bay Steamboat Co. and the Maine Central, Portland & Rumford Falls and Rumford Falls & Rangeley Lakes roads for the courtesies extended in conveying the members and guests of the convention by special boat and trains among the islands of Portland Harbor and Casco Bay to the Rangeley Lakes and through the White Mountains, which were well merited. The companies certainly succeeded in giving to those who were fortunate enough to accept the courtesies a highly enjoyable time.

The meeting adjourned at noon Wednesday, to meet next year in Philadelphia.

RAILROAD GAZETTE

ESTABLISHED IN APRIL, 1856.
PUBLISHED EVERY FRIDAY,
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EDITORIAL ANNOUNCEMENTS.

Contributions.—*Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussion of subjects pertaining to* ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

Advertisements.—*We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay,* EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and those only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers, can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially either for money or in consideration of advertising patronage.*

During September orders for 10,369 cars of all kinds have been noted in our news columns. Of these cars 4,830 were box, stock, furniture and refrigerator cars; 2,575 were coal and gondola cars; 2,100 were steel cars; 700 were flat cars; 50 were tank cars and 114 were for passenger and street railroad service. Of the 10,369 cars noted, about 1,200 are to be built by railroads in their own shops. Orders for 237 locomotives were also noted, of which 24 were for export, and the approximate division of types was 48 passenger locomotives, 157 freight locomotives and 32 switching locomotives. The number of locomotives noted was exactly the same as for August. It will be noted that the car orders fell off by about 2,000 from the August record, which was a very large one for the season, but the September orders are still almost double those noted in July. It is known that orders are being withheld on account of the high prices, at least one large order being deferred and some others reduced in size, on this account.

In connection with the subject of handling trains partially equipped with air brakes, we call attention to some statements of Mr. Kidder, at the last meeting of the Air Brake Men's Association, published elsewhere in this issue. He found that, on a road which claimed to have obtained much better results by controlling such freight trains with the hand brakes of the rear cars, the men were really not following instructions; they were using the air brakes in the same way as other roads and as recommended by the various mechanical associations which have considered the question. The reason given by the trainmen for not obeying the rules requiring the use of hand brakes was that break-in-twos and similar troubles were more liable to occur. Mr. Kidder makes a very positive statement, and while it would be rather amusing if the officers had been misled and had assigned the wrong cause for the improved service, yet such things have been known to happen before. It has always seemed strange that one road could get such good results from a practice universally condemned by air brake men, and one that was found unsatisfactory when tried by other roads having similar conditions.

Judge Thayer, sitting in the United States Circuit Court at St. Louis, has handed down an opinion in the suit of the Kansas City, Pittsburg & Gulf to restrain connecting lines from "boycotting" the Gulf road; and, according to the press dispatches, he rebukes the Receivers of the road for rate cutting; rebukes them so severely that conservative traffic managers all over the country are rejoicing greatly. From the extracts printed we are forced to conclude that the happy feeling spoken of has a foundation about as substantial as the froth on a bowl of eggnog. The words taste good in the mouth, but they will not make much of a change "all over the country." The full decision is not published, and, indeed, only a part of the question appears to have been decided; but the extent of the court's order appears to be that the Receivers (who were appointed by this court) must not carry freight below cost merely to bleed a competitor; when the road is handed back to its owners the Directors may cut rates to their heart's content, as before, provided they do it in a lawful way. The gist of the reported opinion is that

"A road in the hands of receivers should not handle any traffic except at rates which are reasonably remunerative, and, unremunerative rates, even if they do not entail an actual loss, ought not to be put in force upon railroad property in judicial custody merely for the purpose of forcing concessions from other carriers, unless the concession is one of paramount importance, which ought to be clearly manifested."

That is good doctrine, and we are glad that Judge Thayer has laid it down. The real question, however, is as to the "paramountcy" of compelling other roads to let the "P. G." have a share of what they have hitherto considered their own traffic. If the life (or health) of the new road depends on getting some through traffic which older lines will give up only after a fight, is not that fight an important one? The traffic manager will no doubt argue very stoutly that the consideration is unmistakably paramount. Settling rate wars on equitable principles is not so easy as it looks.

The offer of the New York Central to bind itself, in the sum of $4,000,000, not to skim the cream off from the Boston & Albany's earnings for use on its own table, is a very unusual declaration, and seems to be fair. It will probably insure the success of the lease on substantially the original terms. The language of the offer is that the Central will use the earnings only for the purpose of fulfilling its obligations under the lease; which means, practically, that when the net receipts are more than sufficient to pay the interest on the bonds and the 8 per cent. dividend on the stock, either the surplus will be used to improve the property or rates for fare and freight will be lowered. The only substantial objection to the lease has been the fear that the interest of the public might suffer, and this proviso will meet that objection as well as could possibly be done under any scheme for continuing the road under independent management. It will be possible for the Central to keep down the receipts by allotting the lion's share of the earnings on through business to the lines west of the Hudson River; but that is not to be feared under the present management; and if the local business is properly cultivated, as we may expect it will be, the volume of that alone will be so great that the profit on through freight will be but a small proportion of the total income.

We say that the only substantial objection to leasing the Boston & Albany to the New York Central is that which has been made on behalf of the public. We take this view because we believe that those objecting stockholders who are trying to get a higher rental are claiming more than they are entitled to. It is probably pretty nearly correct to say that a guarantee of 8 per cent. for a hundred years is better than can be got on any other property in Massachusetts. Even those stockholders who paid 200 for their shares, and who, therefore, get a guarantee of 4 per cent., are getting a better rate than they would get on government bonds; and who will say that the risk is much greater? It is said that the public objects to "skimming off the cream," to the probable continuance of high fares, and to the high rental. But as far as the rental is concerned, the fact which we have just alluded to, is an essential one to keep in mind; the fact that many of the owners of stock paid for their shares twice their par value. As for fares, the Masachusetts Legislature has complete power in its own hands. As long as the road has to spend hundreds of thousands of dollars yearly on grade crossings it is doubtful whether fares ought to be lowered. The power of the Legislature is so complete that very likely the true interest of the public requires that a majority of the directors of the Boston & Albany (with a suitable voice in the doings of the lessee) shall be residents of the State. This requirement would provide means for giving due expression to public opinion from the stockholder's standpoint as a corrective of that kind of public sentiment which is too often "on top" in the Legislature. As for "skimming," the present offer of the Central would seem to indicate pretty clearly that the purpose and desire of that road is to get complete control of the Boston & Albany line, to be used to insure the continuance to the New York Central of its present profitable business to and from New England, and nothing more. That is a sufficient motive. The rental offered is declared by the Central people to be an adequate compensation for the benefit expected to be derived and nothing has been produced to controvert this claim. If there is ground for the fear that some future management might carry freight or passengers too cheaply east of the Hudson River for the purpose of helping the line west of the River, a provision might be inserted in the lease requiring the divisions of through rates and of receipts from through traffic to be regularly published.

The Am. Soc. C. E. Rail Sections.

The series of rail sections known as the standard of the American Society of Civil Engineers was adopted by that society about six years ago. The formal action of the Society was the culmination of the labors of an able committee for three or four years, and those labors were the crystallization of discussions, study and experiments which had been leading up pretty steadily for some years to the understanding of the theories embodied in these sections. By this time we ought to know something of the results of use of this type of rail section.

The Society section has made good progress in the quantity rolled. One of the great mills gives us the following table of percentages of its total product rolled to the Society section:

1896	44.16 per cent. of total
1897	59.17 " " " "
1898	59.34 " " " "
1899 (8 months)	74.98 " " " "

Another mill reports that 48 per cent. of its product is now rolled to the Society sections. Still another reports that of rails above 50 lbs., 80 per cent. is of the Society sections. The mill which reports in detail as above gives us the following tabulation of the distribution of the weights rolled to this series of sections. That is, of all the American Society rails rolled by this mill, the proportion rolled of various weights was as below:

	1896.	1897.	1898.	1899.
70 lbs	6.55	6.27	4.17	8.11
75 lbs	50.86	32.12	27.77	24.34
80 lbs	35.00	42.64	25.73	30.94
85 lbs	0.82	2.26	10.69	21.59
90 lbs	....	.....	8.34	9.52
100 lbs	....	0.39	1.56	.....

The increased use of the 80 and 85 lb. sections will be noticed. This is what we should expect to find for two reasons: First, the tendency is strong to raise the weight, and when a road changes its standard section to use a heavier rail it would find an opportunity to try the American Society section. Second, for reasons that must now be quite familiar to many of our readers, the theoretical advantages of the Society section as compared with the earlier "unbalanced" sections are greater with heavy rails than with light ones.

Lately there have been signs of a reaction from the strong tendency toward heavy rails. This is not a question of sections, but of weight. The heavy rails recently put in have not been always satisfactory; that is, the companies are not always getting the worth of the money put into the heavier sections in increased wear, and it would not be surprising if in future orders the proportion of weights from 80 lbs. up should decline somewhat, and this is still more likely to be the case if prices keep up. Obviously, at higher prices the railroad companies must make a ton cover more track. It is possible that such a reaction will check the advance of the use of the American Society sections, because if the railroads continue to use the lighter weights which they have been using they will probably also continue to use for a while their own standard sections rather than subject themselves to the many inconveniences of a change in the section for which they get no great advantage. Furthermore, the more or less unsatisfactory performance of recent heavy rails is liable to discredit somewhat the new sections in so far as those recent rails have been rolled to such sections.

Of course the rail makers suffer more from a multitude of sections than the rail users. To them the value of commercial standards is great. Further, we judge that they have realized, pretty well the other advantages which were the object of the design of the American Society section. The rails cool straighter; they can be rolled cooler; the head gets more work; it is easier to make a good rail with given material, and there are fewer seconds. The rolls wear out quicker, but the sum of the advantages is quite overwhelming.

But it seems to be pretty general opinion among those who ought to know that it is mostly the fault of the rail makers themselves that the recent heavy sections have been disappointing. They have not properly increased the amount of the hardening elements; they have not taken the proper precautions in the physical treatment. This is testimony that

we get from men of the highest authority, and probably the physical treatment is considerably more important than the chemistry. It has long been said of rails, as of cast iron wheels, that the companies get what they pay for—that at the going prices a better rail could not be made. This, if once true, is no longer true, for the rail makers are now getting good prices and making money.

What we say now is merely the beginning of an effort to find out something as to the present status of the American Society section. We shall follow the subject up, and meantime hope to hear from our readers as to their opinions and experiences.

Annual Reports.

St. Louis & San Francisco.—Like many other companies whose reports are now coming to hand, this company is able to show a substantial increase in gross revenue because of a marked improvement in passenger revenue. While the total operating income of the company gained $340,194, passenger business alone accounted for $258,572 of the total. Net earnings were not much changed; expenses absorbing $311,082 of the gain in revenue. With a total operating income of $7,226,662, net earnings (39.3 of the total) were $2,885,472, and the balance over all charges was $584,800, a decrease of $101,646 from the 1898 figures. The same dividends were paid, 4 per cent. on the first preferred and 1 per cent. on the second preferred, leaving a balance over all payments of $224,800.

The small gain in freight earnings, $44,497, is attributed to unsettled rate conditions which reduced the ton-mile receipts from 1.055 cents to 1.019 cents. This happens to be exactly the average ton-mile rate of the Atchison, a neighboring road. The larger business done accounted for most of the increase in expenses, $222,000 out of the $311,000 expansion in that account being in transportation expenses. Maintenance cost was $85,000 more than last year's figures, and besides the work carried out on these accounts, $393,126 was spent for improvements and equipment. This sum included $170,118 (less certain credits) for 10 new engines, other new rolling stock and safety appliances, while new construction work called for $239,700, of which the largest single item, $104,000, was three-fourths of the cost of ballasting 100 miles of track. In addition, 300 new freight cars were purchased through car trusts, running until 1903.

Tonnage increased by 61,828 tons, due to a better movement of high class freights, bulk freights falling off. The tonnage of manufactured goods increased nearly 80,000 tons or over a fourth heavier than in 1898.

In the passenger statistics a somewhat better showing is made than in freight, though the passenger-mile rate fell off from 2.188 cents to 2.066 cents. This is explained by President Robinson as due to the development of suburban and interurban travel, an interesting circumstance of the year's operations, as the development of trolley lines at St. Louis, and in its adjacent suburban districts has been on an extensive scale, and has in fact materially reduced the short trip business and revenues of many of the lines entering that city. The building of interurban roads has also progressed materially, and if the effect of this development has been to encourage travel and to develop newer and outlying suburban districts, which steam railroads can best serve, the study of a problem which is vexing a good many transportation officers is helped. The development of this suburban and way travel, represented by an increase of 24.4 per cent. in way business, against 19.2 per cent. in through travel, which is only about half as great as local business measured by passenger-miles.

The account of new lines taken over or under way is an important part of the year's affairs. This company's average operated mileage has increased from 1,282 to 1,642 miles. The principal new lines are the extension to Oklahoma City, 103 miles; the Kansas City, Osceola & Southern, 151 miles, of which about 40 miles is new construction built to complete an entrance into Kansas City; and the Kansas Midland, 106 miles through Southern Kansas, these last two lines being operated under agreements, and only their final results, in the way of surplus or deficit being taken into the operating company's accounts.

Louisville & Nashville.—The record of the year's results is exceptionally favorable. Revenue increased $1,762,800 in gross and $952,976 in net, these accounts for the first time reaching and exceeding the figures attained in 1893, heretofore much the best year for the company. This increase in receipts placed the company in a position where it was able to resume the payment of dividends, suspended in 1893, and during the past year 3½ per cent. has been declared, of which ½ per cent. is an extra payment. These dividends called for $1,848,000, and the balance over was $778,900. Gross earnings were $23,759,486, with operating expenses at 66.21 per cent., leaving net receipts at $8,027,898. Rentals and miscellaneous income raised the receipts by $540,000 to $8,568,543, to meet payments of $5,941,643, representing fixed charges, losses on leased lines, bond discounts and miscellaneous charges. This left an available dividend fund of $2,626,900 on the $52,800,000 of outstanding stock.

These results were on 2,988 miles of operated road, practically the same mileage operated for a number of years past, although the total mileage of the Louisville & Nashville, including controlled lines, and roads owned but not operated is 5,038 miles. A very large proportion of this mileage consists of branches of varying length, pretty thoroughly intersecting the eastern and middle sections of Tennessee and Kentucky and Northern Alabama. This part of the South, including the iron districts, has been very prosperous in the last year or two. This is reflected in the Louisville & Nashville report by the large increase in the average freight train-haul. This was 163.4 miles in 1898, but 180 miles in 1899, an increase of over 10 per cent. As a consequence, the ton-miles gained in much larger proportion than did the tons. The latter were 12,391,000, within 80,000 tons of the 1898 figure, but the ton-miles, 2,231 millions, were 20 millions, or nearly 11 per cent. more than in the previous year.

The total car movement increased only 5.57 per cent, and the revenue train-miles, 4.65 per cent. The average train-load is reported as 205 tons, against 193.7 tons in 1898, a gain of 5.98 per cent. Freight train-mile revenue was $1.50, against $1.45 in the previous year, and the net revenues per train-mile hold nearly all the gain in the gross, being 43.872 cents, as compared with 39.914 cents, a gain of 9.9 per cent. Car-mile receipts also gained, but the ton-mile receipts fell off from 7.50 mills to 7.29 mills. This loss was more than made up by saving in expenses, through the better car and train-loading.

Since the company suspended dividends five years ago it has carried out important plans for the improvement of the road and equipment, the entire cost of which, in some years very heavy, has been paid out of earnings, no charges for construction work having been made to capital account. Such betterment work is detailed in the annual reports. The cost of applying air brakes and couplers during the year was $439,757, and was charged to operating expenses. The company now has over 91 per cent. of its engines and 55.9 per cent. of its freight cars equipped with air brakes, while automatic couplers have been applied to 86.3 per cent. of the freight cars. The new equipment purchased during the year, 15 locomotives, 16 passenger cars and 1,520 freight cars, was provided out of various renewal funds.

New York, New Haven & Hartford.—The report of this company for the year to June 30 shows total gross earnings from operation of $37,144,000 and an interesting fact is that the earnings from the freight department have now risen to be but $3,000 less than the earnings from the passenger department. The operating expenses (being 68.87 per cent.) amounted to $25,581,000. Adding to the net income from operation, dividends and interest on securities owned, there was a total net income of $12,186,000. Out of this $7,820,000 was paid in interest, taxes and rentals and $4,159,000 in dividends, being 8 per cent. The surplus for the 12 months was $207,283. These figures do not include the earnings of the Old Colony Steamboat Co., the Providence & Stonington Steamship Co., or the Norwich & New York Transportation Co., which aggregated $3,784,000. Charges to operating expenses to meet general depreciation aggregated $1,654,000.

The passenger-miles amounted to 861,417,000, and the passenger rate per mile was 1.791 cent. The ton-miles aggregated 1,257,414,000, and the ton-mile rate was 1.411 cent. The gross earnings from operation per mile of road amounted to $18,236.

The total road owned and leased is now 2,018 miles, of which 650 miles has second track and 73.72 miles fourth track. The mileage of sidings reaches the extraordinary figure of 1,103.

The use of electricity was extended 3.4 miles by the third rail system and the Providence, Warren & Bristol Railroad has been prepared for operation by the overhead trolley. The New England and Old Colony lines began to use the South Terminal Station in Boston Jan. 1, 1899, the Boston & Albany began July 23, and the Boston & Providence Sept. 10. The new Back Bay Station was also opened Sept. 10.

Mr. Clark announces formally his desire to retire from the presidency of the company, which matter has been referred to the Standing Committee of the Board.

The Chicago, Burlington & Quincy has introduced a new idea in the organization of the drafting room of the mechanical department. Instead of each draftsman doing miscellaneous designing or drawing under the constant direction of the one in charge, it is the intention to classify the work so that each man will be required to study and know especially about certain parts. Each will be required to read the technical papers and the proceedings of the mechanical societies and keep a card index of information relating to the subjects assigned to him. As a preliminary classification one man will have, so far as possible, all work on boiler and firebox design, grates and front end arrangements, etc., while another will have the frames, cylinders, valve and running gear and locomotive tenders. Other divisions will be: Passenger cars and heavy coal cars; general freight cars; shops and shop arrangements; shop tools. With the usual force each man will get some work of all kinds, but each will be expected to know more than the others about certain subjects, and be able to make useful suggestions. Of course at the bottom of the whole thing is the desire to make something more of the draftsmen than mere machines for drawing lines under close supervision.

NEW PUBLICATIONS.

Railway Engineering. By Cecil B. Smith, M. E., Late Assistant Professor of Civil Engineering in McGill University, Mem. Can. Soc. C. E. Octavo, pp. 210; illustrations; index. Toronto and Montreal: Biggar, Samuel & Co. 1899.

In his introduction the author explains that this is intended as a "foundation course only," and that he has endeavored to epitomize his vast subject in such a way that a student or layman without previous knowledge can grasp it intelligently. He undertakes to cover the subject from the very beginning to the end—to tell the considerations that should govern in the general choice of the route and termini; to discuss the relations of grades and curves to future earning power and maintenance cost; to tell how all surveys are made and how roadbed, bridges, culverts and track are built; and finally to give an epitome of railroad law. He undertakes to analyze the difficult subject of train-resistance and to develop the somewhat intricate theory of easement curves. He treats of rails, their sections and chemistry, and of rail joints. All these things and much more he does in 200 pages of 500 words to the page. Obviously so much ground can be covered only superficially in a book physically so small, and the author quite truly says that the "work is not exhaustive, but merely introductory." Naturally, many things are said in a dogmatic and unqualified way that really cannot be accepted as said, without qualification. In the main, however, there is not much in the book that will seriously mislead, and generally it is safe and sound so far as it goes. It is written from the modern standpoint, indicates good theory and practice and suggests lines of thought and study that may be profitably followed out. In this is its value, rather than as a complete and comprehensive guide to practice in any one branch of the subject treated.

History of the Pennsylvania Avenue Subway and Tunnel in Philadelphia. Compiled by E. C. Quarles.

We have received a volume containing a brief description and many engravings from photographs of the important work which has been carried out in Philadelphia to depress the Philadelphia & Reading Railroad tracks along Pennsylvania Avenue. The descriptive letter press is but four pages, while the engravings occupy about 55 pages. These are made from progress photographs, showing work in many stages, and as such will be of considerable interest to engineers. The subway from Thirteenth Street to a point east of Twenty-second Street is 4,180 ft. long; the tunnel is 2,711 ft. long and the open subway to the westward is 2,150 ft. long. The total length of the work is therefore about 9,000 ft. Throughout the subway and tunnel are four main tracks, and in addition are the side tracks and yard tracks at Broad Street and at Twentieth Street. The estimated cost of the work, including property damage, is $6,000,000, of which the city of Philadelphia pays half and the Philadelphia & Reading Railroad Company the other half. There is nothing on the title page to indicate where the volume can be procured, but we judge that anybody who wants it can find out how to get it by addressing the Philadelphia & Reading Railroad Company.

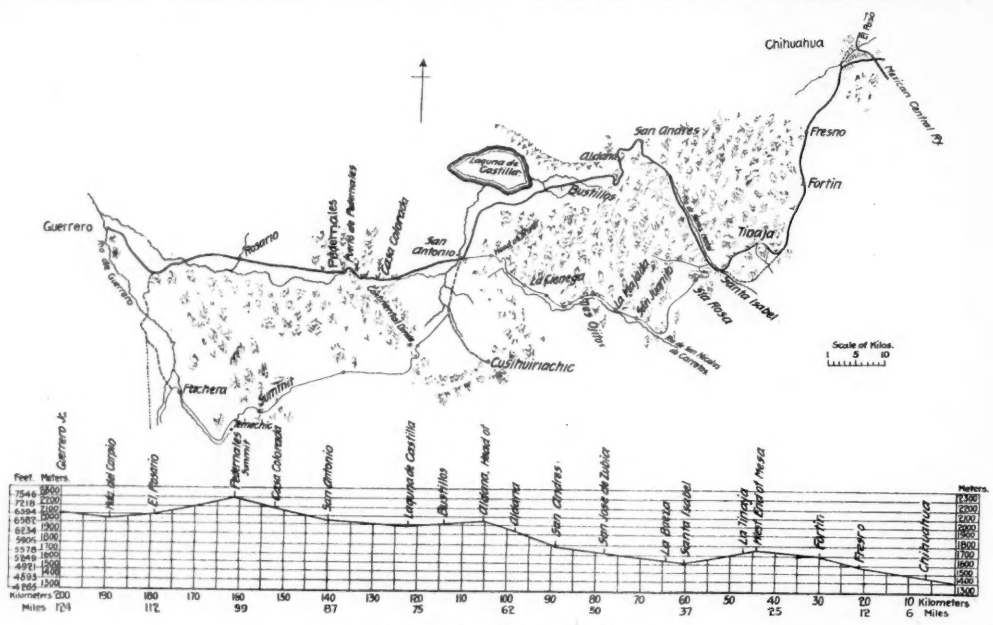
The Steam Indicator and Its Appliances. By William Houghtaling. Octavo, cloth, 307 pages, nearly 150 engravings. Bridgeport, Conn.: The American Industrial Publishing Co. 1899. Price, $2.

This book is for the use of young men employed as firemen or engineers of stationary plants and is without algebraic formulas, and is very plainly written; in other respects it does not differ much from other books on the same subject. It is an instruction book rather than a book for reference.

The different topics are taken up in the usual order; first a brief history of the indicator is given, and an explanation of its uses and how it is made and applied, while a number of different forms of reducing motion are illustrated. Then follow several chapters dealing with indicator diagrams, how they are taken, what they show and how the usual calculations are made. Other chapters treat of indicator testing, planimeters, comparison of diagrams from throttling and cut-off engines, the economy of expansion, the best point of cut-off and back pressure and compression. Directions are given for making calorimeter tests, and in addition to numerous miscellaneous diagrams from steam engines, diagrams taken from gas and oil engines and ammonia compressors are shown. The final chapter treats of engine economy and a number of tables are put at the back of the book such as are found convenient in working up indicator diagrams and engine tests. The index seems to be very complete.

The Chihuahua & Pacific Railroad.

The Mexican State of Chihuahua, the north central State of the Republic, in spite of having constituted for generations the highway between the fertile southern portions of the country, and the United States on the north, has been retarded in its growth. Its mineral production has been enormous, and it boasts some of the largest and richest cattle ranches in Mexico, but the fame of districts like Santa Eulalia, and Cusihuiriachic, and Batopilas, has not sufficed to bring in capital to develop new industries, when against the possibilities of developing valuable mines lie all the disadvantages of semi-arid plains, and costly transportation over boulder-strewn uplands and rugged mountain passes. The Mexican Central Railroad opened up one line of least resistance southward from El Paso, rendering



The Chihuahua & Pacific Railroad.

accessible the Santa Eulalia mines, and others of less note, but "Cusi," and Magistral, and the camps of the Sierra Madre in the western part of the State, were still laboring under heavy disabilities. Into this almost virgin country the Chihuahua & Pacific Railroad is now being built, following the old lines of wagon travel. Within a few months it will be running trains through from Chihuahua (225 miles south of El Paso, Tex., on the Mexican Central) westward to Guerrero, at the foot of the Sierra Madre. In this distance of 125 miles, it passes over the continental divide at an elevation of 7,546 ft. Although the great backbone of the Sierra Madre lies west of Guerrero, the principal rivers have cut through the lofty mountains, and take their rise in what may be called the mountains of the plain. The elevated tablelands from Chihuahua to Guerrero are traversed in a north and south direction by parallel volcanic ridges, so that the railroad encounters some heavy grades in crossing from one mesa to another before reaching what will be the true mountain sections of the line. According to its concession, the road must be carried through to some port on the Pacific coast, as yet undetermined, within seven years. Guerrero, however, will remain the western terminus for some time to come, and will be the chief distributing center for a large portion of the Sierra. The stimulus which this improved accessibility will give to the mining industry in the mountains will necessarily be very great, and it may encourage an earlier extension of the line westward than now seems to be contemplated. When this occurs a considerable agricultural industry would certainly result in the Sierra, where exist many fertile well-watered valleys, peculiarly adapted to the cultivation of beans, peas, and other leguminous plants, while the mountain slopes afford promise for the growth of superior grapes. The region in that respect is strikingly similar to the famous viticultural district of Mendoza at the foot of the Andes in Argentine.

The agricultural possibilities of the plains are also very great. Large areas lie convenient for irrigation from the watercourses which traverse them, and which are never dry, in spite of the apparent aridity of the adjacent country. The chief traffic in the beginning, however, will be cattle, lumber and fuel outward, and general merchandise and mining supplies inward. A short branch line will also tap Cusihuiriachic, from which point there will be heavy shipments of silver ore.

The Chihuahua & Pacific has an assured traffic from the start sufficient to maintain it, with prospects of rapid and large increases within the next few years. In this sense it is not doing pioneer work. It has only to appropriate and improve a traffic which under present disabilities has reached large proportions. This has warranted the construction of an excellent permanent way, with masonry culverts, and substantial bridge foundations throughout. The track is standard gage, laid with 60-lb. rails, and the maximum grades are 2 per cent. The rolling stock is of the best modern type, with air-brakes on freight as well as passenger cars.

The personnel of the company consists of A. H. Paget, President, New York; Enrique C. Creel, Vice-President, Chihuahua; T. J. Brennan, Secretary, New York; G. B. Schley, Treasurer, New York; Charles Sheldon, General Manager, Chihuahua, and Edward S. Safford, Chief Engineer, Chihuahua.

Motor Wagon Trials at Liverpool.

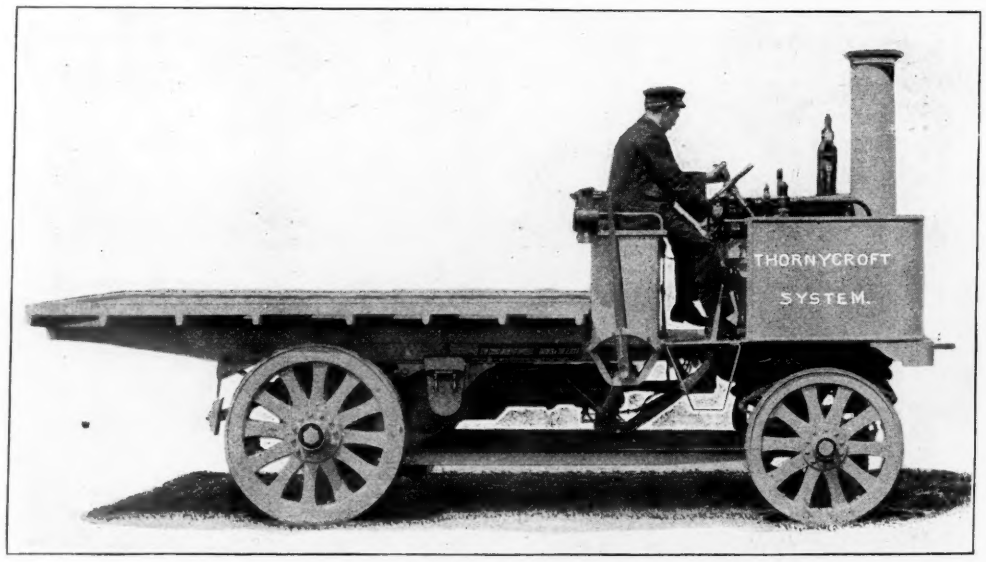
The second annual series of trials of motor wagons for heavy service was held the last week in July at Liverpool by the Liverpool Self Propelled Traffic Association. There were six competitors this year, two more than the year before, and much better results were obtained than in the 1898 trials. A decided improvement has also been shown in the designs over those of previous years.

To the Thornycroft vehicles, one weighing 3½ and the other 6½ tons, were awarded the highest honors, the lighter of the two being shown herewith. The trials included long distance runs and hill climbing tests. The two Thornycrofts, the Leyland and the Baylet, made the trip without any serious accident. The hill climbing tests consisted in running up a zigzag hill about 400 yards long, the most severe grade being 1 in 9. Part of the distance is paved with boulders and part is smooth. The wagons ascended the hill first empty, then loaded, and finally loaded when the road had been slightly watered. In this test some were found to have insufficient adhesion to ascend the heaviest grade when loaded at 4½ tons.

The makers who competed in the trials all used steam as motive power, generated by liquid fuel or coke. Electricity and oil motors were not represented, due in part to limit of weight (three tons) fixed for road vehicles by the Light Locomotives Act of 1896.

The wagon here illustrated has a Thornycroft water tube boiler with special arrangements for the control of steam, and is fitted with a silent-blowing safety valve, besides an auxiliary safety valve. In addition to the feed pump, an injector is fitted for auxiliary feeding.

The engine is compound reversing and entirely enclosed in a dust proof and oil tight casing. The gearing is of the silent chainless type and includes a two-speed gear. The brake is designed to stop the wagon within 20 ft. when at full speed. The floor area of the platform is 65 sq. ft., the frames are of steel throughout and the wagon weighs complete 2 tons 18 cwt. (6,496 lbs.), and the weight in running order with full load is about 7 tons 1 cwt. (15,790 lbs.). The wagon here shown gives a fair notion of the general style of wagon for trucking now being tried in England.



The Thornycroft 3½-Ton Steam Motor Wagon.

New York City Traffic on "Dewey Day"

The crowds of people brought to New York on Sept. 28 and 29 in connection with the celebration of the return of Admiral Dewey from Manila are generally believed to have been the largest in the history of the city. We have as yet but few statistics from the transportation lines.

The Metropolitan Street Railway Co., operating the principal surface lines in Manhattan, about 220 miles of track altogether, reports receipts as follows: Thursday, Sept. 28, $55,950; Friday, $65,219; Saturday, $50,972; Sunday, $35,374. The average receipts on week days at this time of the year are about $40,000 (which represents 800,000 passengers). The total increase of passengers over last year, for the three heaviest days, was estimated at 1,753,300. Of all the passengers carried, about 500,000 rode over two or more lines; that is to say, this is the number of free transfers issued during the three days.

On Saturday the principal lines of the Metropolitan had to suspend business for about six hours on account of the parade. No extra cars were run during the day, but the day schedules were kept up several hours later in the evening than ordinarily.

The Third Avenue Railway (surface line) reports a total of 572,500 passengers for the three heaviest days, an increase of 160,500 over the same period in 1898.

The Delaware, Lackawanna & Western brought to its Hoboken terminal about 38,000 extra passengers. The preliminary estimate is as follows:

	Friday, 29th.		Saturday, 30th.	
	In.	Out.	In.	Out.
Extra trains	40	40	20	20
Cars in same	475	475	170	200
Passengers in same	28,500	24,000	10,000	12,000

The Central of New Jersey, on which there are 151 regular passenger trains in, and the same number out, each day, ran extra trains as follows: Thursday, four in; Friday, 28 in, 27 out; Saturday, 17 in, 19 out; Sunday, 8 out. The estimated number of cars in these trains was 392 in, 432 out.

The Development of the Parsons Steam Turbine.

Nearly 25 years ago Mr. C. A. Parsons invented a steam turbine which has since been modified and improved, and is now commonly known as the Parsons turbine. In 1884 he designed a compound steam turbine for lighting purposes, which ran satisfactorily for some years, the speed being 1,800 revolutions a minute. Since then, turbines have been built having speeds from 700 to 1,200 revolutions a minute.

The first turbine direct connected to a dynamo was put on a ship in 1885. The first installation on land was in 1886, and included two 16 k. w. turbines, one of which is still running, and the other is to be replaced by a 24 k. w. condensing type turbine. The first "turbo-alternator" put into a generating station was at the power house of the Newcastle & District Electric Lighting Co. in 1889. This gave an output of 75 k. w. It was non-condensing, but in 1891 a compound condensing steam turbine was built for the Cambridge Electric Supply Co. This was tested by Prof. Ewing, and the results showed that the

steam consumption of this turbine was about the same as for a good compound condensing engine. These results were very encouraging and led to the formation of the Marine Steam Turbine Co., which in 1893 began work on the well-known torpedo boat Turbina.* This boat made 32.61 knots (37½ miles), and ran at a speed of 2,000 revolutions a minute, the boiler pressure being 210 lbs. and air pressure for draft 7½ lbs.; but owing to the steam pipe not being sufficiently large there was a drop of 50 lbs. pressure between the boiler and engine. Many 600 to 900 h. p. plants have been installed in different electric light stations, and there is now under construction the machinery for two complete alternating current plants of 1,000 k. w. each which are to be placed in the lighting station at Elberfeld, Germany.

In a recent account of the improvements in the Parsons turbine, Engineering (London) points out that the satisfactory results obtained are due to the exceptionally high ratio of expansion, which is between 100 and 200; whereas in the common triple expansion engine in the mercantile marine the ratio of expansion seldom exceeds 16 fold and is usually about 9 fold.

A Log of a Run.

Mr. W. M. Acworth sends to The Engineer (London) the following details of a run which he made on one of the Reading's Atlantic City trains. He sat in the engine cab and took the times with a stop watch. Of course the record is of a plain, every-day, commercial run, and is not remarkable for either the Reading or the Pennsylvania on their Atlantic City lines. At the same time it is an interesting log to put on record, particularly as having been carefully timed by a thoroughly impartial observer.

Philadelphia & Reading Company, engine No. 1,028; Baldwin, four-cylinder, anthracite-burning compound. Engineer Fahl; load, eight cars and over 400 passengers, say 220 English tons, August 22d, 1899. Left Philadelphia, 5 p. m.; Camden, 5.9 p. m.; signal stop outside station, three minutes; second mile-post, 1½ miles out, 5:15:13 p. m.; thence, seconds per mile:

Mile-post.	Secs.	Mile-post.	Secs.	Mile-post.	Secs.
3d	82	21st	47	39th	46
4th	68	22d	47	40th	46
5th	66	23d	..	41st	47
6th	64	24th	..	42d	46
7th	56	25th	46	43d	49
8th	57	26th	48	44th	48
9th		27th	47	45th	48
10th	152	28th	47	46th	46
11th		29th	45	47th	46
12th	97	30th	45	48th	47
13th		31st	46	49th	47
14th	51	32d	46	50th	48
*15th	56	33d	46	51st	46
15th	54	34th	47	52d	44
17th	99	35th	47	53d	46
18th		36th	47	54th	47
19th	49	37th	47	55th	..
20th	46	38th	45	Stop	

*Near the 15th post a gradient of about 1 in 110 (50 ft. per mile), against the load begins and continues for nearly three miles.

Arrival time, 6 hours, 0 minutes 24 seconds; journey time, 51 minutes 24 seconds.

It will be seen that on several occasions, owing to obstruction by passing trains or for other reasons, I failed to time the mile or was forced to lump two or three miles together. Let me further add (with the fear of the criticism of my friend Mr. Rous-Marten before my eyes) that doubtless the speed was more uniform than my figures show. Where, for instance, I have given 49, 46, 47, the actual figures very likely were 48 3-5, 46 2-5, 46 3-5. But in an engine cab at 80 miles an hour, even with all the advantages of the elastic American permanent way, and the high center of gravity, and the equalizing levers of their engines, one's arithmetic becomes shakey, and the working out of subtraction sums to fifths of seconds is almost impossible.

TECHNICAL.

Manufacturing and Business.

The Temple St. Cable Ry. Co., Los Angeles, Cal., will soon be in the market for electrical equipment.

The Northwestern Wrecking & Dredging Co. was incorporated in Oregon, Sept. 22. The incorporators are M. G. Morgan, J. A. Strowbridge and G. P. Edwards. The capital stock is to be $10,000, and the headquarters will be in Portland, Ore. The company will engage in dredging, wrecking and submarine diving and contract work of all kinds.

The Stow Flexible Shaft Co. has found it necessary to more than double its working force within the last six months. The late sales provide in many instances for the operation of flexible shafts by electric and compressed air motors. The portable air motor for use with Stow flexible shafting as made by this company, was described in the Railroad Gazette Nov. 25, 1898, page 845. This company has recently bought the Peck air drill and reamer. We understand also that it intends making a number of air tools and contemplates building air compressors and hoists. Aside from the work which it makes a specialty, the company is now engaged quite largely in building engines, pumps and machinery of special design.

We are officially informed that the Great Northern of Canada will this fall order four snow plows, 25 hand cars and 25 push cars. J. G. Scott is the General Manager, at Quebec, P. Q.

*See Railroad Gazette, May 17, 1897, p. 328.

A meeting was recently held in Pittsburgh of representatives of about two-thirds of the building-brick makers in Allegheny, Pittsburgh and vicinity to discuss plans to join into one single concern, the capital stock to be about $10,000,000.

Some time ago the Pressed Steel Car Co. ordered from the Chicago Pneumatic Tool Co., 10 new Boyer long stroke riveting hammers, which have been used in riveting in building steel cars. An additional order for 60 has just been placed.

H. B. Denker, formerly President of the St. Charles Car Co., has resigned his position as district manager of the American Car & Foundry Co., owing to a paralytic stroke. He has been succeeded by James G. Lawler, who has been Assistant Manager.

The Standard Steel Works recently appointed F. B. Howell & Co., of St. Paul, their agents in the Northwest.

A. C. McCord, of McCord & Co., has just returned from a trip of several months in Europe.

Iron and Steel.

Mr. T. Katayama, Chief Architect for the Japanese imperial household, now in this country, is said to have placed on Oct. 3 an order with the Carnegie Steel Co. for 3,000 tons of structural steel, to be used in the construction of a palace for the Crown Prince of Japan.

Plans have been prepared, according to report, for a 20-acre extension to the plant of the Pressed Steel Car Co., at Joliet, Ill. It will have an added capacity of 30 cars a day. Arrangements have been made for 400 tons of plate a day from the Federal Steel Co.

The Vernon Iron Co., of Campbell, O., has been incorporated, with a capital of $50,000, by John H. Moulton, H. S. Neal, H. C. Burr, J. Harry Moulton and Carl W. Moulton, of Ironton, O. The company proposes to take over the Mt. Vernon Furnace, owned by the Campbell Iron Co., but which has been idle about four years. The plan of the company is to make either charcoal or Bessemer pig.

The Sharon Steel Co. has been chartered in Pennsylvania with a capital of $3,000,000. The company proposes to build at Sharon, Pa., an open hearth steel mill with a capacity of about 1,000 tons daily, and also a blast furnace of about 100 tons capacity. The plant, which will be located between Sharon and Wheatland, is to be completed in a year and a half, but part of the works are to be ready for operation in ten months. The proposed officers and Directors are F. H. Buhl, President; David Adams, Treasurer, and Nevin McConnell, Superintendent. Directors: F. H. Buhl, David Adams, Nevin McConnell, Jas. P. White, of Sharon, and George Dorr and Senators William Flinn and Christopher L. Magee, of Pittsburgh.

The employees of the Franklin Iron Works at Port Carbon, Pa., have been granted an increase of 5 per cent. in wages. The works are in operation night and day.

The Pennsylvania Furnace Co., recently incorporated in Pennsylvania, with a capital of $3,000,000, has bought the Sheridan furnace at Sheridan, Pa., formerly leased to the Sheridan Iron Works, Ltd. The new company also owns an ore right in the Cornwall Ore Banks. The officers of the Pennsylvania Furnace Company are General E. Bird Grubb, President; J. A. Coram, Vice-President; T. E. Hopkins, Treasurer, and H. W. Wesson, Assistant Treasurer. The Board of Directors will include E. C. Swift, J. A. Coram, T. E. Hopkins, Simon H. Stern, of Stern & Rushmore, 40 Wall Street, and General E. B. Grubb.

Interlocking.

The Atchison, Topeka & Santa Fe has put in interlocking switches at North Ottawa, Kan., the junction of the Emporia Branch and the Southern Kansas Division. The machine has 22 levers.

The Lake Superior Steel Co.

The Lake Superior Steel Co., with a capital of $5,000,000, has been organized by Eastern capitalists. Mr. John E. Searles, of New York, a representative of the new company, is negotiating for the purchase of the Ironton Structural Steel Co. and the Duluth Mfg. Co., of Duluth, and the Bessemer and rolling mill departments of the Wisconsin Steel Co., of Superior, Wis. These plants will form the center for making steel in the Northwest. Pig iron will be had from the Duluth Furnace Co., now about going into blast, with a capacity of about 225 tons daily, and from the Hinkle Furnace, of Ashland, 75 miles away, having a capacity of 120 tons a day, which makes charcoal-iron. The Ironton Works has a capacity of 150 tons a day of open-hearth steel and a large rolling mill capacity, chiefly for shapes, having but one large set of plate rolls. The plant at Superior has a capacity of about 150 tons a day of Bessemer billets, and about the same rolling mill capacity, chiefly plates. At the works of the Duluth Mfg. Co., there are a car works, wheel foundry, general foundry and merchant iron mill.

A 30-ft. Channel to Philadelphia.

The Secretary of War has approved the report of the engineers, recommending that a 30 ft. channel be made in the Delaware River from Delaware Bay to Christie St., Philadelphia. The approximate cost is $5,618,000.

The Nicaragua Canal.

Recent reports from Managua say that 60 engineers and other employees of the Isthmian Canal Commission have arrived at San Juan del Norte. The health of the party is reported to be good. Mr. Davis of the U. S. Geological Survey in charge of hydrography, is pushing his work.

The Chicago Tunnels.

The City Engineer has completed plans for lowering the three tunnels under the Chicago River, at Chicago, so as to give a clear depth of 26 ft. above the crown of each tunnel. The estimates of the cost are not yet finished, but it is thought the whole work will cost about $3,000,000. It is proposed to lower that portion of the Van Buren Street tunnel directly beneath the river 8 ft. 11 in., changing the approaches from a 10 per cent. to a 11.06 per cent. grade at the east end, and from a 5.46 per cent. to a 6.32 per cent. grade at the west end. The Washington Street tunnel in the same way is to be lowered 9 ft., the east grade changed from 7.58 per cent. to 9.33 per cent., and the west grade from 6.33 per cent. to 7.87 per cent. Similarly the La Salle Street tunnel will be lowered 9 ft., the south grade changed from 4.32 per cent. to 5.89 per cent., and the north grade from 4.83 per cent. to 6.44 per cent. The changes in the last two tunnels named will result in an extension of the covered portion of the cut at the openings and will provide additional space in the streets for teaming at points where traffic is now badly congested. The plans also provide for the replacement of the center pier bridge at Washington Street with a rolling lift bridge.

Steel Contract in Brazil.

The Riter-Conley Mfg. Co. of Pittsburgh, Pa., has received a contract for the steel work for the power house building about to be built by the São Paulo Electric Light & Power Co., at São Paulo, Brazil. The São Paulo Co. is now asking for prices on 500,000 ft. of terra cotta duct in which to lay wires, and for 5,000 wooden trolley poles.

THE SCRAP HEAP.

Notes.

Canadian newspapers say that the Standard Code of Train Rules was ordered to be put into effect throughout the lines of the Grand Trunk Railway, on October 1. Heretofore the Grand Trunk rule concerning meeting points of trains of the same class required each train to wait for the other; so that in adopting Rule 81 (formerly 384 and originally 84) a radical change is made in the practice.

The Canada Atlantic Railway has bought two large steel lake steamers, and it is reported that three more will soon be purchased, making a fleet of five, which the company will use in its grain business next year. This road, which has taken considerable export grain from Chicago this year, announces that by next July it will have a railroad line through to Quebec, thus making a short water and rail line from Chicago to the Atlantic Ocean by way of Lakes Michigan and Huron, Georgian Bay, Parry Sound, Ottawa, Montreal and Quebec. The two steamers carry about equal loads of 4,500 tons each, and they are as large as can now get into the Chicago River. It is said the Canadian route by the Welland Canal and St. Lawrence River has been the chief sufferer from the competition of the Canada Atlantic since its opening two years ago, and that except grain shipped on the Ogdensburg boats, not a single grain cargo has cleared from Chicago for Lake Ontario for months.

The question of an alleged blacklist among the Chicago railroads at the time of the strike in 1894 has again been brought into court at Chicago in a suit of Joseph O'Day against the Chicago & Northwestern and the Wabash Railroads. O'Day, who was a yardmaster on the Chicago & Northwestern, claims he has been blacklisted and asks for $50,000 damages. The suit is similar to the Ketcham case. (Dec. 31, 1897; Jan. 7 and Jan. 21, 1898). Ketcham obtained a verdict of $21,666 against the Chicago & Northwestern for alleged blacklisting, but a new trial was ordered, and the case has not yet been up for the second hearing. In granting the new trial the Judge said: "the verdict would not stand for a moment in a higher court." The plaintiff's attorney in the O'Day case is the same man who brought the suit for Ketcham.

Electric Hauling on the Canals.

We noticed recently the organization of a strong company to apply electricity to hauling canal boats. The stockholders of this company recently met in New York and elected a Board of Directors representing a good deal of money and influence. The officers elected are Louis A. Von Hoffman, a Wall Street banker, as President; Mr. Frank W. Hawley, President of the West Indies Telegraph & Cable Co., as Vice-President and Mr. A. B. Donaldson as Secretary.

Another Long Distance Trolley Road.

The Buffalo & Erie Electric Railroad has been incorporated in the State of New York with a capital stock of $1,000,000. It is the proposition to build about 70 miles of street railroad between Buffalo and Erie.

Profit Sharing on Railroads.

Mr. Stuyvesant Fish, President of the Illinois Central, states in the September Proceedings of the St. Louis Railway Club, that profit sharing on railroads is impracticable. He says: "In my opinion it is not practical because of the difference in the length of service, character of service, method and the times of employing men engaged in the work. For instance, our out-of-door work on the track is practically suspended in the Northern States for some months together, track forces being disbanded or reduced very materially every autumn. Hence, through no fault of their own, large numbers of men, while working year after year for the company, are not in continuous employment in the service and cannot get the benefits which ought to accrue for continuous employment. On the other hand, it would not be fair to those who are continuously employed, day in and day out, year after year, to put them on a par with these track laborers whose employment is, after all, only occasional. Instances might be multiplied and run through all branches of the service. More than twenty years ago we endeavored to work out something of this sort on the old Chicago, St. Louis & New Orleans Railroad, then running from Cairo to New Orleans, but had to give up the attempt. The Illinois Central has nothing in its service approaching to profit sharing, but has, for several years past, encouraged and aided those in its employ in purchasing shares of the company's stock."

A Little War Story.

The story of the stealing of Baltimore & Ohio locomotives at Martinsburg, W. Va., during the Rebellion and their transfer across the country for service on Southern railroads has been lately retold by an officer of the Baltimore & Ohio, who recently made some inquiries of old employees who were at Martinsburg at the time the incident happened. These employees say that on June 19, 1861, 200 men of Stonewall Jackson's command were detailed to destroy the Baltimore & Ohio's cars and engines at Martinsburg. They piled wood and coal over 41 engines and nearly 400 cars and then set fire to them. Only ten or twelve of the engines, however, were very seriously damaged. Col. Thomas Sharp arrived in Martinsburg on August 18, 1861, and was there until the following March, engaged in removing engines and machinery. He took eight engines across the country over the turnpike, either to Staunton, Winchester or Strasburg, 32 horses being required to haul each engine. He also removed all the duplicate parts of engines and cars and all the rough iron at the station, and took away all the machinery and tools. These latter were afterward used in Southern arsenals. The country around Martinsburg is extremely hilly and the work of getting the engines over the country roads required considerable engineering ability. Col. Sharp is still living in Ohio. It has been currently reported in late years that one of the locomotives was the Winans' camelback No. 99, which at that time was numbered 77, but Col. Sharp did not care for this class of engines and took only ten-wheel and passenger engines. There was only one eight wheel locomotive taken, and that was No. 34. Some years after the war Col. Sharp was employed on the Baltimore & Ohio as Master of Transportation.

Chicago Elevated Railroads.

Construction work is progressing rapidly on the Northwestern Elevated, and the last of the contracts, which include the stations, have been let. During the last week it was reported that negotiations for the purchase of this road by an Eastern syndicate had been begun, but nothing definite can be learned about the matter at this time.

September traffic of the Metropolitan Elevated shows a gain of about 25 per cent. compared with the same month in 1898, and during the latter part of the month the daily average number of passengers carried was 80,000, which is a little more than that for October, 1898, although October traffic should be slightly heavier than that for September. The last of the new coaches ordered by the road will be put in service within two weeks, 18 having already been received.

Suggestions for the M. C. B. Association.

Mr. C. W. Wanghop, Chief Joint Car Inspector at East St. Louis, Mo., in the September Proceedings of the St. Louis Railway Club, says that the St. Louis Joint Association has a rule which the M. C. B. Association should adopt. This is that any car delivered to the owner with missing material which could have been repaired by the delivering company and charged to the owner shall be received by the owner without card or charge. He states that the St. Louis roads during the past year have saved about $50,000 in the greater mileage made by cars through the working of this rule. Cars are allowed to go forward to the owners where the proper material is on hand for repairs, so repairs can be made more quickly.

Bridges in India.

Mr. R. F. Patterson, U. S. Consul General at Calcutta, writes; "In the interest of our bridge manufacturers, I would call attention to the following correspondence, in reference to bridges about to be contracted for on the Southern Mahratta Railway, British India. I wrote to the Honorable Secretary to the Government of India, Public Works Department, that 'I am informed that several large iron or steel bridges will be contracted for on the Southern Mahratta Railway, and I have the honor to ask if proposals for the work will be entertained from the United States.' The following answer has been received: 'Stores for the Southern Mahratta Railway Company, as for other railway companies, are got out through their home boards on the advice of their consulting engineers, contracts for girders and iron work for State Railways worked by the State are arranged for by the Director-General of Stores, at the India Office.'

"The following are the consulting engineers of the various railroads of India, with whom our bridge manufacturers should correspond if they desire to bid for contracts that may be in contemplation, viz.: Sir A. M. Rendel & Son, 8 Great George Street, Westminster, S. W. London, for Indian State Railways, East Indian Railway, Bengal & Northwestern, Southern Mahratta, and Bengal Central; Sir George A. Bruce, 3 Victoria Street, London, S. W., for Great Indian Peninsula Railway, Indian Midland and South Indian. It would also be well to correspond with the Director-General of Stores, India Office, London, with reference to contracts on the State Railways worked by the State."

Chicago Drainage Canal.

The Drainage Board has ordered that part of the dam at Joliet in which bad cement was used be rebuilt at an expense of $15,000.

The State Commission is making steady progress with the inspection of the drainage canal, and expects to complete its report to the Governor of Illinois by Dec. 1.

Chicago Public Works.

The Board of Local Improvements has let contracts for sewers for five streets and alleys. On Sept. 30 bids were opened for paving 30 streets and alleys. Bids are asked for Oct. 7 for the paving of 13 important streets, at an estimated cost of almost $300,000. The largest contract of the lot will be for Wood Street, from Washington Boulevard to West Twelfth Street, with brick at a cost of over $60,000.

The Illinois Telephone & Telegraph Co. has been granted a permit to build a conduit 4 ft. by 7½ ft. through the downtown district. The tunneling is to be done by the shield system. The conduit is to be 31 ft. below the surface and used for telephone and telegraph wires only.

Lake Notes.

The passenger steamers Gordon and Ivanhoe were burned at Chicago Sept. 28. Loss about $30,000.

Lake Michigan lines report a heavy business in package freight. The Lake Superior & Lake Michigan Transportation Company had to charter an extra steamer for one trip to Duluth.

The Chicago Shipbuilding Co. has laid keels for three more freight carriers of about the same size and type as the Manila, recently noted in this column.

Technical Schools.

University of Iowa.—Dr. George E. MacLean, whose election to the presidency of this University was noted some months ago, was formally installed on Sept. 29 by Governor Leslie M. Shaw of Iowa, at Iowa City. A number of Presidents of Universities and other prominent educators were present. Dr. MacLean was born in Connecticut, and is 50 years old. He graduated from Yale in 1871 and later received his doctor's degree at Leipsic. Still later he spent nine years in the faculty of the University of Minnesota, and in 1895 became Chancellor of the University of Nebraska, where he remained until elected to his present position.

LOCOMOTIVE BUILDING.

The Grand Trunk will build 10 locomotives at its Point St. Charles shops.

We are officially informed that the Texas Midland is not in the market for locomotives at present.

The Baldwin Locomotive Works are building one engine for the Santa Fe Terminal of California.

The Chicago, Rock Island & Pacific is getting bids on 16 10-wheel freight locomotives, and will probably order this week.

We are officially informed that the Great Northern of Canada will order this fall 12 locomotives. J. G. Scott, General Manager, Quebec, P. Q.

In our issue of Sept. 15 we noted that the Burlington, Cedar Rapids & Northern had ordered 10 engines from the Brooks Locomotive Works. We now understand that the works are building 20 engines for this road.

The Pittsburgh, Bessemer & Lake Erie has ordered one consolidation engine, with 22 in. x 28 in. cylinders, from the Baldwin Locomotive Works, two switching engines, with 19 in. x 26 in. cylinders, from the Brooks Locomotive Works, and two consolidation engines, with 23 in. x 30 in. cylinders, from the Pittsburgh Locomotive & Car Works.

In our issue of Sept. 22 we stated that the Duluth & Iron Range was considering buying 10 locomotives. The road has placed an order with the Schenectady Locomotive Works for six heavy 12-wheel freight locomotives, duplicates of similar engines which the company has built for that road, and four 10-wheel freight engines with 19 in. x 26 in. cylinders.

The Pittsburgh & Lake Erie has ordered from the Pittsburgh Locomotive & Car Works 10 consolidation engines. They will weigh 140,000 lbs. with 126,000 lbs. on the driving wheels and have 20 in. x 26 in. cylinders, 50 in. driving wheels straight boilers with a working steam pressure of 180 lbs.. and a tender capacity for 4,500 gals. of water and 16,000 lbs. of coal. The engines will be equipped with Westinghouse brakes, steel axles, Monitor injectors, Leach sanding devices and Nathan lubricators.

The Belt Railway of Chicago has placed an order with the Richmond Locomotive & Machine Works for four six-wheel switching engines. They are for January delivery, and will weigh 118,000 lbs.; they will have 19 in. x 26 in. cylinders; drivers will be 51 in. in diam.; boilers, straight top radial stay, with a working steam pressure of 180 lbs. and containing 250 tubes, 11 ft. long, with an outside diameter of 2 in.; fireboxes, 96 in. long, 34 in. wide, of steel; tank capacity for water, 3,500 gals. They will be equipped with Westinghouse-American air brakes, Otis steel axles, Kewanee brake beams, Gould couplers, Monitor injectors, Stevens piston and valve rod packings, Ashton safety valves, Leach sanding devices, Nathan sight feed lubricators, French springs, Ashton steam gages, Midvale driving wheel tires, cast iron wheel centers, Cook & Strong bell ringers, Sargent brake shoes and American balanced slide valves.

The Wisconsin Central has ordered from the Brooks Locomotive Works six six-wheel switching and four 10-wheel freight engines. Four of the former will weigh 110,800 lbs., and have 19 in. x 24 in. cylinders, 51 in. driving wheels, Belpaire boilers with 225 charcoal iron tubes 2 in. in diam., and 11 ft. 1⅛ in. long; fireboxes, 97 in. long and 33 in. wide; working steam pressure, 180 lbs. and tank capacity, 4,000 gals. of water; the other two will weigh 120,000 lbs. and have 19 in. x 26 in. cylinders Belpaire boilers, with 272 charcoal iron tubes 2 in. in diam. and 11 ft. 1¼ in. long; fireboxes, 102 in. long and 42 in. wide and tank capacity, 4,000 gals. of water. The freight engines will weigh 149,000 lbs. with 115,000 lbs. on the driving wheels and have 20 in. x 26 in. cylinders; 63 in. driving wheels; Belpaire boilers, with 308 charcoal iron tubes 2 in. in diam. and 13 ft. 2¼ in. long and a working steam pressure of 200 lbs.; fireboxes, 113 in. long and 42 in. wide and a tank capacity for 4,500 gals. of water. The special equipment includes Westinghouse air brakes, Monarch brakebeams, Chicago couplers, Jerome piston rods and Brooks Locomotive Works valve rod packings, French springs and Midvale driving wheel tires.

CAR BUILDING.

The Western New York & Pennsylvania is getting prices on 50 box cars.

The Michigan Central is about to order 100 cars from the Pressed Steel Car Co.

Pullman's Palace Car Co. is building one passenger car for the Rio Grande Western.

The 500 box cars ordered by the Wisconsin Central, as noted last week, are to be of 60,00 lbs. capacity.

The Jacksonville & Southwestern, a new road, has ordered 10 cars from the Georgia Car & Mfg. Co.

We are reliably informed that the Wheeling & Lake Erie will order about 10 more passenger cars.

The Reading has ordered 1,000 freight cars from the American Car & Foundry Co., to be built at Milton.

The Chicago, Rock Island & Pacific is getting materials for 600 cars, to be built at its Horton shops.

It is reported that the Detroit & Lima Northern has asked the court for permission to buy new rolling equipment.

The Central Railroad of New Jersey has placed an order with Haskell & Barker for 1,000 box and 500 gondola cars.

The New York Central & Hudson River has ordered 250 flat cars of 100,000 lbs. capacity from the Pressed Steel Car Co.

We understand that the Rock Island & Peoria has ordered 50 box cars of 60,000 lbs. capacity from the American Car & Foundry Co.

The report published last week that the Wisconsin Central had ordered 500 box cars from the American Car & Foundry Co., is correct.

The Lake Shore & Michigan Southern has ordered 500 wooden gondola cars of 80,000 lbs. capacity from the American Car & Foundry Co.

Bids for 24 passenger cars for the Boston & Albany, referred to last week, were all in Oct. 3, and it was expected that the contract would be let the latter part of this week.

Last week we noted that the Delaware & Hudson had placed an order for 500 cars with the American Car & Foundry Co. They will be built at the Berwick, Pa., shops.

It has been reported that the Hocking Valley would order some new passenger coaches, but we are officially informed that this road is not at present considering such an order.

We are reliably informed that the Minneapolis, St. Paul & Sault Ste. Marie order for from 1,200 to 1,500 box, furniture and refrigerator cars, noted last week, will be let this week.

In addition to the specifications published last week in connection with the 500 coal cars ordered by the Delaware & Hudson Canal Co. from the American Car & Foundry Co., Johnson hopper doors, furnished by McCord & Co., will be used.

We are officially informed that the Philadelphia & Reading is still working on an order for 600 cars at its own shops, of which 250 are yet to be built, but that no order has been placed for new cars, as reported in a contemporary last week.

In our issue of Sept. 29 we noted that the Chicago, Lake Shore & Eastern would get bids on 1,000 steel cars. We are now informed that they will be side dump coke cars built of structural shapes on patents of J. M. Maris, of the Illinois Car & Equipment Co., and that the contract will be let by the Federal Steel Co., in New York.

We are officially informed that the Great Northern of Canada will this fall order eight first-class and 11 second-class passenger cars, four sleeping, parlor and dining cars; eight baggage, express and mail cars; 300 box and cattle cars; 100 flat cars, four cabooses and four refrigerator cars. J. G. Scott is General Manager, at Quebec, P. Q.

The Chesapeake & Ohio has ordered eight passenger cars from Pullman's Palace Car Co., for delivery in or before June, 1900. They will be 70 ft. long, 9 ft. 11¾ in. wide and 14 ft. 3½ in. high. They will have wooden underframes, Pullman make steel axles, double iron bolsters, National hollow brake beams, Christie brake shoes, Westinghouse brakes, lead lined brasses, Buhoup three-stem couplers, Forsyth curtain fixtures, Pantasote curtain materials, Baker heaters in connection with safety steam heat anti-pounding device, Pullman journal boxes modified to take M. C. B. key and axle, M. C. B. journal box lids, electric and Pintsch gas light, C. & O. standard paint, Standard steel type A platforms, Empire roofs, Pullman's standard trucks with M. C. B. fittings, Pullman's standard vestibules and Paige wheels.

BRIDGE BUILDING.

ALLENTOWN, PA.—Reports state that the Lehigh Valley RR. will soon build the proposed bridge over the West End Branch at North Seventh St. The bridge will be 250 ft. long. (June 16, p. 436.)

BALTIMORE, MD.—Plans are now being made for the new Wilkins Ave. bridge to be built by the Baltimore & Potomac RR. over the railroad tracks. An electric railroad will use it.

BENTON HARBOR, MICH.—A viaduct will be built by the Chicago & West Michigan to a proposed new station.

BINGHAMTON, N. Y.—The general plan for the Chenango St. viaduct, prepared by A. H. Sutermeister, Superintendent of the Grade Crossing Bureau, have been approved by the Erie and the D., L. & W. railroads. It will extend from Lewis to Eldridge Sts., and will be about 900 ft. long, of which 543 ft. will be steel and the remainder masonry ap-

proach. The cost is estimated at $140,000. The Board of Railroad Commissioners made final determination on Oct. 4.

CHICAGO, ILL.—The Trustees of the Chicago Sanitary District on Sept. 26 approved the agreement with the City of Chicago for building a bascule bridge across the Chicago River at Canal St. The City and the Drainage Board will each pay one-half the cost.

DANIELSON, CONN.—The plans for the proposed bridge over Five Mile River, at Water St., have been prepared. (Aug. 18, p. 587.)

EATON, O.—Preble County has sold $15,000 of bridge bonds and $8,000 building bonds. W. A. Eidson, Co. Auditor.

FLORIDA, N. Y.—A bridge and a dam over the Schoharie Creek, being built by Sherman & McDonough, of Troy, were washed away by high water last week. The structures were for the Empire State Power Co. The bridge was 350 ft. long.

GRAND RAPIDS, MICH.—The Board of Public Works has made estimates for next year's bridge budget. The estimates are for a bridge at Butterworth Ave., using spans from the bridges at Pearl St. and Bridge St., new and heavier bridges at Bridge and Pearl Sts. being desirable. No contracts will be entered into this year.

HARRISBURG, PA.—The Grand Jury has recommended that a suitable bridge be built over the Philadelphia & Reading tracks at Rutherford Station.

HUNTINGDON, QUE.—At a recent meeting of the Huntingdon County Council it was decided to build a bridge across Trout River at Starks.

KANKAKEE, ILL.—Bids with plans and specifications are wanted Oct. 16 for building a concrete bridge over the Kankakee River at Washington Ave., to cost about $40,000. The bridge will be 593 ft. long, of six spans, 26 ft. wide, with sidewalks of 6 ft. R. D. Gregg, City Engr. H. C. Clarke, Mayor.

LEYDEN, N. Y.—The Havana Bridge Co. has a contract for an iron bridge over Black River, at $4,700. It will have two spans of 78 ft. each.

LINDSAY, ONT.—The town will probably build an iron bridge with wooden approaches over the river at Ridout St. in 1900.

LOCKPORT, ILL.—The Trustees of the Chicago Sanitary District have let a contract to the Joliet Bridge & Iron Co. for the bridge across the Drainage Canal, at its bid of $20,975. (Sept. 29, p. 683.)

MARYSVILLE, O.—Bonds for $5,000 for new bridges will be sold Oct. 6. J. F. Pearse, Town Clerk.

MONROE, MICH.—Clarence A. Black and others, of Detroit, who recently secured an electric railroad franchise, will build a $5,000 bridge.

NATCHEZ, MISS.—The Virginia Bridge & Iron Co., of Roanoke, Va., has a contract for two iron bridges for Adams County. They are of 60 ft. span and 150 ft. over all, on iron caissons filled with concrete. The price is $4,981 for the two bridges. (Sept. 22, p. 665.)

NEW WESTMINSTER, B. C.—The municipality of Burnaby wants tenders for building a bridge on North Avon road.

OREGON, ILL.—Ogle and Lee counties will build an iron bridge over the Rock River, at Grand Detour, at an estimated cost of $40,000. James C. Fesler, Co. Clerk.

OTTAWA, ONT.—The residents of Ottawa East want a steel bridge built over the canal road in place of the wooden structure.

PATERSON, N. J.—Bids were opened Sept. 29 for the Main Street steel bridge. The bid of $64,750 by F. R. Long & Co., New York, was the lowest of those considered. There were 12 other bids—the highest of which was $70,000.

PITTSBURGH, PA.—The Columbia Bridge Co. was chartered Sept. 26 to make articles of commerce from iron and steel, etc., with its place of business in Mahoning Township, Lawrence County, and its principal office at Pittsburgh. Capital stock, $30,000. Directors: George W. Knoff, A. Kountz, Joseph Kountz, H. L. Kountz and J. L. Kountz, Pittsburgh, and John C. Ort, Allegheny.

PIQUA, O.—A bridge estimated to cost $4,000 will be built at Ash St. The city will pay for the foundations and Miami County for the superstructure.

PORTLAND, ORE.—The County Commissioners will receive proposals until Oct. 14 for rebuilding the Madison St. bridge. The specifications require work which really amounts to building a new bridge, using the metal work in the old combination structure. Approximate cost, $25,000.

READING, PA.—Last week the County Commissioners received seven proposals for the 50-ft. steel bridge over Swamp Creek. The lowest bid was $1,200, by the Groton Bridge Co., who offer to finish the work in 60 days. The highest bid was $1,300.

RICHFIELD, UTAH.—The Sevier County Commissioners have ordered estimates made for a bridge across the Sevier River between Monroe and Elsenora.

SAN JOSE, CAL.—The Supervisors want bids on two combination bridges on San Francisco road, one over San Antonio Creek and the other over Madero Creek.

SIDNEY, O.—Bids are wanted, according to report, Oct. 17, for a bridge across Laramie Creek, in Van Buren Township. Address J. S. Laughlin, Auditor of Shelby County.

SHERBROOKE, ONT.—The Grand Trunk Ry. has let a contract to the Detroit Bridge & Iron Works for substituting a heavier superstructure for the bridge over the Magog River. The old piers and abutments will be used.

SHREVEPORT, LA.—Bids are wanted Oct. 12, according to report, for a bridge at this place. Address P. P. Keith.

SPOKANE, WASH.—The County Commissioners want bids by Oct. 13 for a bridge across the dry gulch on the Pine Bluff road, eight miles northwest of the city. The bridge will be 40 ft. in length.

WASHINGTON, IA.—The Boards of Supervisors of Washington and Johnson counties met Sept. 28 and opened the bids for the bridge over the Iowa River at Hollands Ferry and rejected all the bids as being too high. The bids ranged from $11,773 to $15,650. D. C. Kyle, County Engr.

Other Structures.

BALTIMORE, MD.—The contract for building four of the new buildings for the new plant of the United Rys. & Electric Co., in Southwest Baltimore, has been let to John Waters. These buildings will cost about $500,000, and are as follows: Car barn, 370x368 ft., divided into four sections, separated by brick walls; paint shop, 240x310 ft.; erecting shop, 270x260 ft.; storage house, 175x180 ft. The buildings will be of brick, one story high, with steel roofs. Contracts are yet to be let for the following: Motor erecting shop, 130x210 ft., with buildings containing toilet rooms, lockers, supply rooms and heating apparatus; cabinet shop, 85x270 ft.; mill shop, 130x270 ft.; power house, 80x100 ft.; two machine shops, one 90x285 ft. and the other 90x368 ft.; armature room, 80x90 ft.; two blacksmith shops, 90x200 ft. each. The buildings will be one story high and fire-proof.

BELLEFONTE, O.—The Pennsylvania Match Co., recently incorporated, will, according to report, build a factory 60x260 ft. in Bellefonte. Among the incorporators are Col. W. Fred Reynolds, Joseph L. Montgomery and S. A. Donachy.

BENTON HARBOR, MICH.—A new passenger station will be built by the Chicago & West Michigan.

BIRMINGHAM, ALA.—The Dimmick Pipe Co., D. B. P. Dimmick, of Anniston, Ala., President, will build a new plant.

BOSTON, MASS.—Plans have been prepared by Messrs. Cabot, Everett & Mead for a four-story fire-proof building to be used as a home for working girls, to be built at Chandler and Cazenove Sts., South Boston.

Moses Williams and Edw. A. Bangs, Trustees, will build an 11-story fire-proof office building on Pemberton Sq. Messrs. Fehmer & Page are the architects.

BUFFALO, N. Y.—The American Express Co. will build a new office building estimated to cost $70,000. Plans have been prepared.

CHICAGO, ILL.—The Chicago Telephone Co. has let contracts to Jonathan Clark & Sons for five new telephone stations, for all of which D. H. Burnham & Co. are the architects. The first one to be built will be located at 273 East Chicago Ave. It will be two stories high and 50x90 ft. It will be of fire-proof construction, with terra cotta front, and will cost about $30,000. The other new stations will be at 1197 Sheffield Ave., 22 Seeley Ave., 4122 Union Ave. and 6308 Stewart Ave. The total cost of buildings and equipment will be about $1,000,000.

The Union Stock Yards & Transit Co. will soon replace the buildings lost by fire two weeks ago. Plans have been made for a new horse pavilion. The pavilion is to be a four-story brick structure, 64x194 ft., at the corner of Forty-third and Halstead Sts. It is to cost $60,000. The barn is to be of brick also, 92x198 ft., and is to be at the southwest corner of the same street intersection. It is to cost $15,000.

The Commonwealth Electric Co. has taken out a permit for building a new power house at Wallace and Fifty-sixth Sts., at a cost of $75,000. The foundation dimensions of the building are to be 114x110 ft.

The Illinois Malleable Iron Co. is about to begin construction on a foundry boiler room and engine room at Diversey Ave. and the railroad tracks of the Northwestern Co. The buildings are to cover 100x311 ft. and are to cost $25,000.

The Illinois Central RR. has begun the construction of a freight house covering 36x100 ft. at Michigan Ave. and Randolph St. It is to cost $8,000.

CINCINNATI, O.—Fire during the night of Sept. 30 destroyed the Big Four depot and warehouse in Pearl St. between Central Ave. and Plum St., including several adjoining buildings. The Smith St. bridge across the tracks, the sheds of the Union passenger station and 30 cars were partially destroyed.

COLUMBIA, MO.—Sealed proposals will be received until 11 A. M., Oct. 16, by the Executive Board of the University of the State of Missouri for the erection and completion of a brick hospital and clinic building at Columbia. Copies of the plans and specifications can be seen after Oct. 4. J. G. Babb, Secretary Board of Curators.

COLUMBIA, PA.—The Supplee Steam Engine Co., reports state, will build an annex to its foundry.

DARLINGTON, S. C.—The Atlantic Coast Line depot and 20 cars of freight were burned Sept. 24.

EATON, O.—See "Bridge Building."

FT. DODGE, IND.—It is proposed to build a new $100,000 county court house. Address G. F. Rankin, Co. Clerk.

FT. WAYNE, IND.—The Pennsylvania Co. will receive bids in Ft. Wayne next Tuesday for building the new freight depot.

HONESDALE, PA.—The Delaware & Hudson Co., according to report, will build a new depot in this town.

INDIANAPOLIS, IND.—Architect Jacob Herald, 441 Chestnut St., Philadelphia, Pa., has plans out for bids on alterations and additions to the store and office building at Eighth and Callowhill Sts. for the Kingan Mfg. Co., of Indianapolis. Bids are wanted for galvanized and ornamental iron work, piping and steam fitting, electric wiring, brick, stone, cement, hardware, etc.

JEFFERSON, O.—A library and engine house will be built. Bids are wanted Oct. 14. D. L. Crosby, City Clerk, may be addressed.

JUAREZ, MEX.—Plans have been completed for the Mexican Central's new station at Juarez, which will replace the one burned down a few months ago. Approximate cost, $45,000. Bids are wanted. Lewis Kingman, Ch. Engr.

MADISON, WIS.—The Gishot Machine Co. will build a foundry, 100x160 ft.

MONESSEN, PA.—The Page Wire Woven Fence Co. will add two large open-hearth furnaces to its equipment. The Wellman-Seaver Engineering Co., New England Building, Cleveland, O., the engineers, are now receiving bids.

NEW YORK, N. Y.—The Commission appointed by the Secretary of the Treasury to pass on drawings submitted in competition for the new Custom House in New York, to be erected on the Bowling Green site, has recommended that Mr. Cass Gilbert, of 111 Fifth Ave., New York, be selected as the architect of the building, and that he receive a formal appointment.

NORFOLK, VA.—The Southern Construction Co. has been incorporated to build railroads, canals, bridges, wharves, reservoirs, power plants, buildings and machinery, etc. The capital is $3,000, but will be increased later. The officers are: John Y. Gossier, of Philadelphia, President; Charles N. Wire, of Philadelphia, Vice-President; Jesse B. Kimes, of Philadelphia, Secretary and Treasurer.

The Southern Railway warehouse No. 2 at Pinner's Point was destroyed by fire Sept. 29. The building was 761x200 ft. in dimensions, and, with contents, valued at several hundred thousand dollars.

OSWEGO, N. Y.—The coal trestle of the Lackawanna Railroad at this place will be rebuilt during the close of navigation.

PADUCAH, KY.—The Illinois Central will build a new depot in the southern part of the city. Estimated cost, $35,000.

PERTH AMBOY, N. J.—Bids will be asked in about three weeks for the buildings for the Standard Underground Cable Co.'s plant. H. J. Lewis, C. E., Pittsburgh, Pa., prepared the plans.

PHILADELPHIA, PA.—Mr. Horace Trumbauer, architect, Land Title Trust Building, has completed plans for a factory and office building for the Murrell Dobbins Co., at 1511 Sansom St. This will be four stories and basement, about 150 x 40 ft., having galvanized iron work, structural iron, etc.

Bids are asked for building several structures for the new factory of the Bernstein Mfg. Co., at Third and Westmoreland Sts. The buildings will be of brick, stone and iron construction. They will extend along Third St. 293 ft. and on Westmoreland St. 197½ ft. A foundry wing will measure 60x79 ft. There will also be a picker house, 110x60 ft., and a stable 140x120 ft. The plans are by J. Franklin Stuckert & Son.

Permission is granted the Pennsylvania RR. and the William Cramp & Son Ship & Engine Bldg. Co. to build extensions to their wharves.

PHŒNIXVILLE, PA.—The Phœnixville Cold Storage Co. has been organized, with ex-Senator Becker, of Philadelphia, as one of the incorporators. A cold storage plant will be built at a cost of about $35,000.

RICHMOND, VA.—The Chesapeake & Ohio and the Sea Board Air Line have accepted the plans of Wilson Bros. & Co. of Philadelphia, Pa., for the union depot to be built in Richmond. A few changes in the plans will be made and then bids will be wanted.

SHARON, PA.—The car barns and eight cars of the Valley St. Ry. were destroyed by fire Oct. 2.

SPRINGFIELD, MASS.—Proposals will be received until 2 P. M., Oct. 24, at the Treasury Department, Washington, D. C., for the construction (except heating apparatus) of the extension of and alterations in the U. S. Postoffice building at Springfield. James Knox Taylor, Supervising Architect.

STREATOR, ILL.—The Vulcan Western Co. have been established here and will build a plant to cost at least $80,000, including engines, boilers, etc.

TEMPLETON, MASS.—The Gardner & Templeton St. Ry. Co. is having plans made for a power house. F. K. Greenwood, President.

TOLEDO, O.—Part of the plans for the new union passenger station have been made. The entire structure is estimated to cost $100,000.

VICKSBURG, MISS.—Wright Bros., according to report, contemplate building a new warehouse.

WASHINGTON, D. C.—The plans of Mr. Geo. B. Post, of New York, have been selected for the new Department of Justice building, which is estimated to cost $900,000.

WEST POINT, N. Y.—Proposals are wanted until Oct. 27, 12 M., for building an addition to the Cadet Hospital. Address Q. M., U. S. M. A., West Point.

MEETINGS AND ANNOUNCEMENTS.

Dividends.

Central RR. of N. J.—Quarterly, 1 per cent., payable Nov. 1.

Chicago & Eastern Illinois.—Quarterly, preferred, 1½ per cent., payable Oct. 2.

Delaware, Lackawanna & Western.—Quarterly, 1¾ per cent., payable Oct. 20.

North & West Branch (Phila.).—Four per cent., payable Nov. 1.

Union Pacific.—Semi-annual, preferred, 2 per cent., payable Oct. 2.

Meetings and conventions of railroad associations and technical societies will be held at follows:

American Association of General Passenger and Ticket Agents.—The annual convention will be held at Boston, Mass., Oct. 17.

American Society of Civil Engineers.—Meets at the house of the Society, 220 West Fifty-seventh street, New York, on the first and third Wednesdays in each month, at 8 p. m.

American Society of Railroad Superintendents.—The next meeting will be held at the Holland House, New York City, on Oct. 10.

American Street Railway Association and Street Railway Accountants' Association of America.—The annual convention is set for Oct. 17, at Chicago, Ill. T. C. Pennington, Secretary, 2020 State St., Chicago.

Association of Engineers of Virginia.—Holds its formal meetings on the third Wednesday of each month from September to May, inclusive, at 710 Terry Building, Roanoke, at 5 p. m.

Association of Railway Superintendents of Bridges & Buildings.—The annual convention will be held Oct. 17, in Detroit, Mich. S. F. Patterson, Secretary, Concord, N. H.

Boston Society of Civil Engineers.—Meets at 715 Tremont Temple, Boston, on the third Wednesday in each month, at 7.30 p. m.

Canadian Society of Civil Engineers.—Meets at its rooms, 112 Mansfield street, Montreal, P. Q., every alternate Thursday at 8 p. m.

Central Railway Club.—Meets at the Hotel Iroquois, Buffalo, N. Y., on the second Friday of January, March, May, September and November, at 10 a. m.

Chicago Electrical Association.—Meets at Room 1737, Monadnock Building, Chicago, on the first and third Fridays of each month at 8 p. m. J. R. Cravath, Secretary.

Civil Engineers' Club of Cleveland.—Meets in the Case Library Building, Cleveland, O., on the second Tuesday in each month at 8 p. m. Semi-monthly meetings are held on the fourth Tuesday of each month.

Civil Engineers' Society of St. Paul.—Meets on the first Monday of each month except June, July, August and September.

Engineers' Club of Cincinnati.—Meets at the rooms of the Literary Club, 25 East Eighth street, on the third Tuesday of each month, excepting July and August, at 6.30 p. m.

Engineers' Club of Columbus, (O.)—Meets at 12½ North High street on the first and third Saturdays from September to June.

Engineers' Club of Minneapolis.—Meets in the Public Library Building, Minneapolis, Minn., on the first Thursday in each month.

Engineers' Club of St. Louis.—Meets in the Missouri Historical Society Building, corner Sixteenth street and Lucas place, St. Louis, on the first and third Wednesdays in each month.

Engineers' Society of Western New York.—Holds regular meetings on the first Monday in each month, except in the months of July and August, at the Buffalo Library Building.

Engineers' Society of Western Pennsylvania.—Meets at 410 Penn avenue, Pittsburgh, Pa., on the third Tuesday in each month, at 7.30 p. m.

Locomotive Foremen's Club.—Meets every second Tuesday in the club room of the Correspondence School of Locomotive Engineers and Firemen, 335 Dearborn street, Chicago.

Montana Society of Civil Engineers.—Meets at Helena, Mont., on the third Saturday in each month at 7.30 p. m.

New England Railroad Club.—Meets at Pierce Hall, Copley Square, Boston, Mass., on the second Tuesday of each month.

New York Railroad Club.—Meets at 12 West Thirty-first street, New York City, on the third Thursday in each month at 8 p. m., excepting June, July and August.

Northwest Railway Club.—Meets on the first Tuesday after the second Monday in each month at 8 p. m., the place of meeting alternating between the West Hotel, Minneapolis, and the Ryan Hotel, St. Paul.

Northwestern Track and Bridge Association.—Meets at the St. Paul Union Station on the Friday following the second Wednesday of March, June, September and December, at 2.30 p. m.

St. Louis Railway Club.—Holds its regular meeting on the second Friday of each month at 3 p. m.

Southern and Southwestern Railway Club.—Meets at the Kimball House, Atlanta, Ga., on the second Thursday in January, April, August and November.

Technical Society of the Pacific Coast.—Meets at its rooms in the Academy of Sciences Building, 819 Market street, San Francisco, Cal., on the first Friday in each month, at 8 p. m.

Western Foundrymen's Association.—Meets in the Great Northern Hotel, Chicago, on the third Wednesday of each month. A. Sorge, Jr., 1533 Marquette Building, Chicago, is Secretary.

American Institute of Mining Engineers.

San Francisco dispatches last week reported that about 1,000 members of the Institute were in that city for the opening of the annual meeting on Sept. 25. On the conclusion of the meeting, Sept. 29, the delegates were taken in special trains for a tour of California.

New England Railroad Club.

The regular meeting of the New England Railroad Club will be held at Pierce Hall, Copley Sq., Boston, Mass., Tuesday evening, Oct. 10, at 8 o'clock. Gen. Wm. A Bancroft, Vice-President of the Boston Elevated, will read a paper on the Boston Elevated Railroad System, illustrating the address with views of the existing system and that now building.

St. Louis Railway Club.

At the Sept. 8 meeting of the St. Louis Railway Club, Mr. E. L. Adreon, President of the American Brake Co., was elected a member of the Executive Committee to fill the vacancy caused by the resignation of Mr. W. A. Garrett. Mr. W. W. Rider, Superintendent of Telegraph of the Burlington system, will read a paper at the next meeting on the "Railroad Telegraph, Its Uses and Abuses."

Engineers' Club of Cincinnati.

The 108th regular meeting of the club was held on the evening of September 21, with 12 members and one visitor present. Mr. W. M. Venable, who was connected with the engineer corps of the United States Army during the late war with Spain, entertained the club with a description of the work accomplished by that branch of the service in the establishment and maintenance of the large camps at Montauk Point, N. Y., and at Mariano, Cuba.

American Street Railway Association.

A special train will leave Boston at 10.30 a. m. Sunday, Oct. 15, over the Boston & Albany, for the meeting of the American Street Railway Association to be held at Chicago, beginning Oct. 17. This train will meet the train from New York over the New York Central leaving the Grand Central Station at 1.15 on Oct. 15. A special rate of 1½ fare on the certificate plan has been made and the usual provisions will be made for securing the reduced rate. Those desiring to go by the special train are advised to communicate with Mr. Milton C. Roach, General Eastern Passenger Agent, 413 Broadway, New York.

American Society of Civil Engineers.

At the meeting of the Board of Direction, on Sept. 5, the announcement was made that Mr. John Fritz had been unanimously elected an Honorary Member of the Society.

At the meeting of Oct. 4, a paper by Mr. S. Bent Russell will be presented, entitled "Impact Tests of Structural Steel." This appeared in the August number of the Proceedings.

At the meeting of Oct. 18 a paper will be presented by Mr. Lewis M. Haupt entitled, "The Reaction Breakwater as Applied to the Improvements of Ocean Bars." This paper appears in the September issue of the Proceedings. The paper is descriptive of a curved breakwater built and located from the designs of Prof. Haupt at Aransas Pass., Tex., for the purpose of creating a navigable channel at least 25 ft. deep. Prof. Haupt now says that notwithstanding the very unfavorable reports and opinions expressed by boards of engineers, up to the end of February, after 15 months' service, the breakwater had caused a depth at its particular part of the bar of from 8½ ft. to 22 ft. An appendix to the paper discusses the theory of the reaction breakwater.

In the September number of the Proceedings is published a paper on "A Test of a Mechanical Filter" by Mr. E. B. Weston, which will be presented at the meeting of Nov. 1. Discussions are printed in this same issue of Hill's "Tests of Bituminous Coal," Haswell's "Pile Driving Formulas," Metcalf's "Groined Arch Cover for Reservoirs and Filters," Curtis's "Preservation of Railroad Ties by Zinc Chloride," and Rafter's "Theory of Concrete."

PERSONAL.

(For other personal mention see Elections and Appointments.)

—Mr. George F. Evans has entirely severed his connection with the Westinghouse interests, having resigned as Manager of the Westinghouse Manufacturing Co., Limited, Canada.

—Mr. John Nathan Binnix, General Superintendent of the Central Iron & Steel Co., died at his home in Harrisburg, Pa., Sept. 30, at the age of 65. Mr. Binnix had been in the iron business for the greater part of his life.

—Mr. G. F. Jones, who has been 14 years Secretary of the Richmond Locomotive Works, has resigned that position to become Southern Representative of the Baldwin Locomotive Works. His headquarters and office will for the present be in Richmond.

—Mr. Richard Carroll, who in May last resigned as First Vice-President and General Manager of the Mobile & Ohio, was found dead on Sept. 28, in his room at the Munro Hotel, Cincinnati, O. He was born in Ireland, in 1847. Mr. Carroll began his railroad career as brakeman on the Atlantic & Great Western in 1865. He was at one time General Superintendent of the Queen & Crescent, and later became General Manager of the same line.

—Mr. Charles Philip Coleman, who has just been appointed Purchasing Agent of the Lehigh Valley, was born in Baltimore, Md., in 1865. Mr. Coleman is a graduate of the Lehigh University and has risen to his present position from that of clerk in the Passenger Department. He was connected with this road continuously from 1887 to 1898, when he resigned to become Purchasing Agent for the Bethlehem Iron Co.

—Mr. F. S. Bond, who will in January next sever his connection with the Chicago, Milwaukee & St. Paul as Vice-President, is a native of Massachusetts. Mr. Bond entered the railroad service on the Norwich & Worcester in 1849. In 1851 he was elected Secretary of the Cincinnati, Hamilton & Dayton. Six years later he became Secretary and Treasurer of the Auburn & Allentown and the Schuylkill & Susquehanna, and he was for a time Vice-President of the Missouri, Kansas & Texas and the Texas & Pacific. In 1881 he became President of the Philadelphia & Reading, and in 1884 President of the Cincinnati, New Orleans & Texas Pacific and the other roads in the "Queen & Crescent" system. He became Vice-President of the C., M. & St. P. in 1886.

—Mr. William Cooke died at his home in Paterson, N. J., Sept. 28. He was born in Albany, N. Y., August, 1830, and worked with his brothers, John, Watts and James, in locomotive works in Paterson. In 1857 he went to Scranton, Pa., and organized there the firm of William Cooke & Co., which afterwards became the Dickson Mfg. Co. Mr. Cooke served as a director in this company and Superintendent of the Locomotive Department until 1868, when he returned to Paterson and with his brothers organized the Passaic Rolling Mill Co. He was President of that concern until 1873, and from that time until 1878 he was engaged in the business of selling machinery in New York City with Cooke & Beggs and William Cooke & Co. Since 1878 Mr. Cooke took no active part in business.

—We discover from the published proceedings of the Board of Direction of the American Society of Civil Engineers, just issued, that Mr. John Fritz, M. Am. Soc. C. E., has been elected an Honorary Member of the Society. As officially stated, he received the unanimous vote of all members of the Board of Direction, and all Past Presidents, which is, of course, what anybody who knows Mr. Fritz would expect. Mr. Fritz finds himself in a distinguished company, of which he is a distinguished member. In the latest published list of the members of the Society we find the names of but eight honorary members, these being Col. Julius Adams, Sir Benjamin Baker, Gen. Craighill, Prof. Davidson, of California; Mr. G. E. Gray, of California; Mr. C. S. Storrow, of Boston; Mr. W. H. Wilson, of Philadelphia, and Gen. Wright, of the Army. Of this little group, Gen. Wright has since died.

—Mr. Richard Caffrey, General Inspector of Track, Lehigh Valley Railroad, died of apoplexy at South Bethlehem, Pa., Tuesday, September 26, 1899. Mr. Caffrey was born in Ireland in 1836 and came to this country in 1844. He lived during various periods at Phillipsburg, N. J., White Haven, Pa., and since 1891 at South Bethlehem, Pa. He entered the service of the Lehigh Valley Railroad in 1855, continuing in active service with this Company for 44 years, until his death. He occupied successively the positions of Section Foreman, Roadmaster, Supervisor, General Roadmaster, Engineer Maintenance of Way and General Inspector of Track. He was an active member of the Roadmasters' Association of America, having served as President in 1897; also as member of the Executive Committee for a number of years. He was also Honorary member of the New England Roadmasters' Association.

—Mr. Samuel Nott, formerly Superintendent of the Hartford, Providence & Fishkill, and a well-known figure in New England railroad circles for many years, died at his home in Hartford, Conn., on Sunday last. Mr. Nott was 84 years old. He was born in India, his father having been one of the first missionaries sent to that country by the American Board. The family returned to America after a few years and Samuel Nott became a devoted Episcopalian. He was educated by his father, but at an early age became a civil engineer and took part in the original surveys for the Hartford, Providence & Fishkill, now the Highland Division of the New York, New Haven & Hartford. He was Superintendent of the road from about 1859 until the property changed hands, about 1879. Mr. Nott was never married. He was interested in many charitable enterprises, and the later years of his life have been largely devoted to philanthropic work. He was an honorary member of the Boston Society of Civil Engineers.

ELECTIONS AND APPOINTMENTS.

Boston & Albany.—At the annual meeting in Boston September 27 and 28, the following were elected Directors for the ensuing year: William Bliss of Boston, A. G. Bullock of Worcester, Zenas Crane of Dalton, E. L. Davis of Worcester, E. S. Draper of Hopedale, Chauncey M. Depew of New York, Edward D. Hayden of Woburn, Samuel Hoar of Concord, Richard Olney of Boston, Jacob C. Rodgers of Peabody, Stephen Saulsbury of Worcester, Charles S. Sargent of Brookline, and J. A. Rumrill of Springfield. (See RR. News Column.)

Central RR. of New Jersey.—F. L. Morse has been appointed Assistant Division Superintendent, with headquarters at Jersey City, N. J.

Chicago, Milwaukee & St. Paul.—President A. J. Earling at a meeting of the stockholders held Sept. 23, was elected a Director, succeeding Charles D. Dickey.

Chicago, Rock Island & Pacific.—W. I. Allen, Assistant General Manager at Chicago, Ill., having resigned, A. J. Hitt, General Superintendent of the lines east of the Missouri River will assume the duties of that office with the title of General Superintendent of the entire system; his headquarters to remain at Chicago, Ill. The office of Assistant General Manager is abolished. W. M. Hobbs, heretofore Division Superintendent at Des Moines, Ia., has been appointed Superintendent of the lines east of the Missouri River, including Atchison and Leavenworth Terminals and excepting Chicago Terminal District, with headquarters at Davenport, Ia. W. H. Stillwell, General Superintendent of lines west of the Missouri River, will take the title of Superintendent of same lines, with headquarters at Topeka, Kan. W. J. Lawrence, heretofore Division Superintendent of the Southwestern Division at Trenton, Mo., has been transferred to the Iowa Division, with headquarters at Des Moines, Ia., succeeding Mr. Hobbs. W. H. Given has been appointed Division Superintendent of the Southwestern Division, with headquarters at Trenton, Mo., succeeding Mr. Lawrence, effective Oct. 2.

Delaware, Lackawanna & Western.—W. E. Dowle, formerly Chief Clerk to W. A. Fleming, Western Freight Manager, has been appointed Division Freight Agent, with headquarters at Buffalo, N. Y., effective Oct. 1.

Illinois Central.—At a meeting of the stockholders held Sept. 27, J. D. W. Cutting was elected a Director, succeeding R. Goelet.

Lehigh Valley.—Charles P. Coleman has been appointed Purchasing Agent, succeeding Wm. C. Alderson.

Michigan Central.—W. Macmillan, heretofore Assistant General Freight Agent at Buffalo, N. Y., has been appointed Assistant General Freight Agent, with headquarters at Chicago, Ill., succeeding B. E. Hand. F. Zimmerman has been appointed Assistant General Freight Agent, with headquarters at Buffalo, N. Y., succeeding Mr. Macmillan.

Missouri Pacific.—D. Hardy, heretofore Superintendent at DeSoto, Mo., has been appointed Superintendent, with headquarters at Sedalia, Mo., of the following lines: St. Louis to Kansas City (including tributary branches), Lexington and Southern Divisions, Jefferson City, Boonville and Lexington Division, Nevada and Minden Division, Interstate Division, Kansas & Colorado Pacific Railway (Chetopa to Coffeyville), and Fort Scott Central Railway, succeeding L. D. Hopkins, resigned, effective Oct. 1.

Northern Pacific.—Alfred Lovell has been appointed Superintendent of Motive Power, succeeding Wm. Forsythe.

Orford Mountain.—At a meeting of the stockholders A. H. Moore and E. F. de Varnnes were elected Directors.

Perry County.—Wm. S. Seibert has been appointed Auditor, succeeding W. B. Sheibley, resigned.

Philadelphia & Reading.—Geo. C. Bowers has been appointed Trainmaster, with headquarters at the Reading Terminal. H. B. Voorhees has been appointed Assistant Trainmaster, with headquarters at Reading Terminal. His jurisdiction is to extend over the Germantown and Chestnut Hill, Norristown, Plymouth and Doylestown branches and Stony Creek RR. F. P. Thompson has been appointed Assistant Trainmaster, with headquarters at Third and Berks Sts. His jurisdiction is to extend over the Bethlehem, New York, Trenton and Frankford branches and Port Reading, Philadelphia, Newtown and New York and North East Pennsylvania railroads. Frank D. Hain has been appointed Trainmaster, with headquarters at Reading Terminal. Effective Sept. 25.

South Potomac.—The officers of this company, referred to in the Construction column, are: President, W. H. Faux, Philadelphia; Vice-President, S. M. Manifold, York, Pa.; Secretary and Treasurer, H. B. Gilkeson, Romney, W. Va. These, with B. J. Baker, Petersburg; J. Wm. Gilkeson, Moorfield, W. Va., and W. H. Boggs, of Franklin, W. Va., form the Board of Directors.

Wabash.—A. Robertson, Acting Superintendent, has been appointed Superintendent of the Middle Division. H. W. Ballou has been appointed Trainmaster of the 9th (east of Decatur) and 13th Dis-

tricts, succeeding Mr. Robertson. J. W. Evans has been appointed Trainmaster of the 6th, 7th and 8th Districts, succeeding Mr. Ballou, transferred. A. Travis Whitsel has been appointed Division Inspector of Fuel and Locomotives of the 6th, 7th, 8th and 13th Districts, and the Bement-Decatur line, including both these terminals, succeeding Mr. Evans. Effective Sept. 24.

Washington & Columbia River.—Jos. McCabe, General Manager, has been elected First Vice-President.

Wheeling & Lake Erie.—J. E. O'Hearne has been appointed Master Mechanic of the Toledo Division, with headquarters at Toledo, O.

RAILROAD CONSTRUCTION.
New Incorporations, Surveys, Etc.

ABERDEEN & ROCK FISH.—The company, according to report, has made arrangements to issue $50,000 in bonds to build 20 miles of extension from Raeford, N. C., eastward. The terminus is not yet determined. (July 7, p. 499.)

ACME TAP.—The company has secured right of way by condemnation, and will begin soon to build its line from Acme, Hardman Co., Tex., north 1½ miles, to the mines of the Salina Cement Plaster Co. (April 21, p. 288.) The principal office is at Quanah, Tex. Fred H. Quincy of Salina, Kan., is President. (Official.)

ALABAMA & TOMBIGBEE.—Track is laid from Fulton, Ala., to Nettleboro, seven miles, and an additional mile is graded. The route as projected is from Fulton, via Nettleboro, to Lower Peachtree, 14 miles. The rapid advance of cost of materials has stopped the work until spring. There are no bonds and no debts against the road. The work is being done by the company. (April 7, p. 252.) Geo. R. Hannon of Fulton, Ala., is General Manager and Purchasing Agent; John L. Cowan, of Opelika, Ala., Engineer. (Official.)

ALBERT LEA & SOUTHERN.—Right of way is reported contracted for and 50 cars of rails are on hand for this line, recently incorporated in Minnesota, to build from Lyle, Mower County, northwest about 30 miles, to Albert Lea, connecting two branches of the Chicago, Milwaukee & St. Paul. W. A. Morin and W. E. Todd, of Albert Lea are incorporators. (Sept. 29, p. 685.)

ALGOMA CENTRAL.—Geo. W. Shotts, U. S. Commercial Agent at Sault Ste Marie, has the following to say with reference to this new road:

The Algoma Central Railway, which is one of the roads granted a subsidy of $3,200 per mile by the Canadian Government, is to run from Sault Ste. Marie, Ontario, in a northerly direction to Dalton, on the Canadian Pacific Railway, a distance of about 160 miles, with a branch running from Dalton southwesterly about 40 miles to Michipicoton, a harbor on Lake Superior.

The Lake Superior Power Company owns the franchise, and I am informed that the branch running from Lake Superior to Dalton on the main line of the Canadian Pacific Railway is under construction, and that it will be completed as far as the "Helen" hematite iron mines, about 12 miles, by the 1st of November, 1899, and the balance of the branch will be completed next summer.

It is understood that the Ontario government has promised an additional land bonus of 6,400 acres per mile.

The country through which this road runs shows outcroppings of minerals, principally iron and copper, with some gold, and it is expected that valuable mines will be developed.

The ore of the Helen mines is brown hematite iron, and is claimed to be very high grade. The company has done considerable development work, and claims that by the time the road is finished to the mines this fall, it will be able to ship 1,000 tons of ore per day. It is constructing large docks at Michipicoton for loading the ore into vessels.

The same company also informs me that it has completed arrangements for building large smelting works here, for treating all kinds of ores (said to be by a new electrical process), to be completed within a year. The stock of this company is owned principally by citizens of the United States. (Sept. 22, p. 667.)

ARIZONA ROADS.—The Thompson Development Co., of Butte, Mont., and New York City, is reported to have bought the copper mines of Shannon & Hughes and will build a railroad from Deming.

The Ray Copper Mining Co., Ltd., of Riverside, Ariz. will shortly ask bids for grading a narrow gage railroad from its mines near Riverside.

A. J. Daggs, of Phœnix, Ariz., has filed notice to build a road from Ehrenburg, on the Colorado River, western boundary of the Territory, to run northeast across the Territory to Fort Defiance, on the eastern boundary.

ARKANSAS & CHOCTAW.—Locating surveys are reported completed as far as Durant, I. T., about 125 miles west of Choctaw City, Ark. The road is to be extended in all about 300 miles through Indian Territory into Texas. W. H. Carson of Texarkana, Ark., is Superintendent. (June 16, p. 439.)

ARKANSAS CENTRAL.—The extension from Fort Smith, Ark., east 46.5 miles, to Paris, has been completed. (March 9, p. 179.) The road was further projected to Little Rock and Hot Springs, but as the road is in the hands of a Receiver, no further extension will be made. (Official.)

BALTIMORE & OHIO.—The sharp curves at Lineberg, W. Va., on the second division, are being replaced by tangent, eliminating about 24 degrees of curvature. This requires a removal of about 13,000 cu. yds. of material.

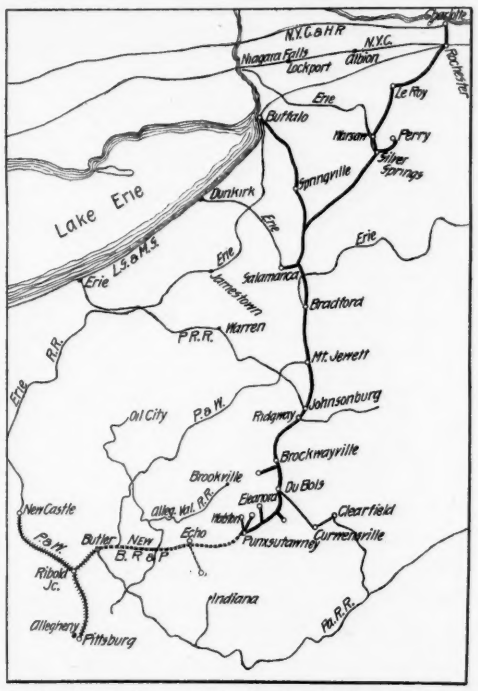
BANGOR & PORTLAND.—The company has been extending its line about two miles from Nazareth, Pa., in the direction of Bath, to proposed cement works. (Official.)

BLACK RANGE.—This company was incorporated in New Mexico Sept. 24, with a capital stock of $200,000, to build a railroad from Magdalena, on the Atchison, Topeka & Santa Fe, to run south 90 miles, to Chloride. The incorporators are Charles F. Greyson of Silver City, H. O. Bursom of Santa Fe, Harry W. Kelly and Cony T. Brown of Socorro.

BUCKHANNON RIVER.—This company has been incorporated in West Virginia, with a capital stock of $10,000, to build a railroad from Newlonton, on the West Virginia & Pittsburgh, to run southeast into Randolph County to the head of Helvetia Fork of the Buckhannon River. The incorporators are: D. P. Morrison, J. E. Morrison, R. S. Rexford and R. E. Rexford, of Indian Camp, and Henry Lewis, Jr., of Newlonton.

BUFFALO & SUSQUEHANNA.—The firm of F. H. & C. W. Goodyear each year builds 40 to 50 miles of branch road to be used temporarily for lumbering purposes in connection with the B. & S. They have under contemplation an extension of 35 miles in the timber land, but it will not be decided before the first of the year. (Official.)

BUFFALO, ROCHESTER & PITTSBURGH.—The extension of this system was opened up for freight Sept. 14, and for passengers Oct. 2. The newly built section runs from Punxsutawney, west about 60



The Buffalo, Rochester & Pittsburgh, with New Extensions.

miles to Butler, from which point the company has trackage rights over the Pittsburgh & Western west to New Castle, and south to Pittsburgh and Allegheny. (Aug. 18, p. 588.)

BURLINGTON, CEDAR RAPIDS & NORTHERN.—This company, according to report, is building a line from Worthington, Minn., northwest about 50 miles, to the western line of the State, in the direction of Sioux Falls.

CALIFORNIA NORTHWESTERN.—Work is to be begun early this month, according to report, on the San Francisco & Northern Pacific extension from a point near Asti, to run northwest to Christine, in Mendocino County. (Aug. 25, p. 623.)

CANADIAN PACIFIC.—Pupore & McVeigh, who have the contract for 30 miles of the Arrow Head & Kootenay extension from Arrow Head, B. C., southeast up Fish River and thence along the western side of Trout Lake and Lardo River to a point near Argenta, hope to have their section ready for the rails this season. Several spurs are being located to tap mines of the Lardeau. (May 5, p. 323.)

An officer writes with reference to the proposed extension to the New York & Ottawa line from the St. Lawrence & Ottawa track south of White Bridge, that the proposed line is but a short Y, half a mile in length. He confirms the statement that the company is extending its yards at Fort William, Ontario. (Sept. 22, p. 666.)

CENTRAL OF NEW JERSEY.—A spur track is reported building at Bayonne, N. J., to the site of the proposed boiler making plant of the Babcock & Wilcox Co.

CHATHAM & LEBANON VALLEY.—This company, recently incorporated as successor to the Lebanon Springs line, is to spend several hundred thousand dollars in restoring its road. Only about 11 miles has been operated in recent years. The line runs from Chatham, N. Y., to Bennington, Vt., 57.1 miles.

CHICAGO, BURLINGTON & QUINCY.—Rails are being laid at the rate of 3,000 ft. per day, according to report, on the extension from Alliance, Neb., westward toward Hartville. (June 30, p. 482.)

CHICAGO, INDIANA & EASTERN.—The company has completed the section from Converse, Ind., to Matthews, 28 miles, and is building from Matthews to Muncie, 15 miles. (July 21, p. 531.) E. Drew, of Fairmount, Ind., is General Manager. (Official.)

CHICAGO, IOWA & DAKOTA.—This line, which runs from Eldora Junction, Ia., northwest to Alden, is reported contemplating an extension this winter from Alden northwest about seven miles to Oakland Valley, with a further extension next year into Minnesota.

CHICAGO, MILWAUKEE & ST. PAUL.—Surveyors are reported in the vicinity of Grand Rapids, Wis., laying out a line from Berlin, northwest about 60 miles, to that city. The C., M. & St. Paul is supposed to be back of the project.

COLUMBUS, MARSHALL & NORTHEASTERN.—About 100 men are at work on this line fram Marshall, Mich., north about 140 miles, via Olivet, Kalamazoo, Vermontville and Alma to Bay City. Grading is completed to within 3½ miles of Olivet and rails and ties are on hand to complete the line to that city. H. E. Hollon, of Marshall, is President. (Sept. 29, p. 685.)

COPPER RANGE.—Grading and track laying are completed for five miles from Greenland, Mich., to Twisted River, on this line; from Houghton southwest 41 miles, to Greenland. C. E. Loss & Co., Chicago, have the contract. Grading is being finished rapidly and track laying is in progress from Houghton southwest. (Sept. 22, p. 667.) Thos. Appleton, of Houghton, Mich., is Chief Engineer. (Official.)

DAVENPORT, ROCK ISLAND & NORTHWESTERN.—This company is building under the Davenport, Clinton & Eastern charter (Sept. 29, p. 685), the extension from Davenport, Ia., northeast 35 miles, to Clinton. J. M. McDonald & Co., of New York have the contract. About 18 miles is graded and track laying will be begun about Oct. 10. Good progress is being made on the bridges and trestles; all the rails and rolling stock required are bought. H. B. Schuler, of Chicago, Ill., and Davenport, Ia., is President; C. E. Dearborn, Chief Engineer. (Official.)

DULUTH & NORTHEASTERN.—The proposed route of this line is from Hornby, Minn., northeast 28½ miles, to Island Lake, with 12 miles of branches. H. C. Hornby of Colquet, Minn., is Vice-President and General Manager. (Official.)

FAYETTEVILLE & ALBEMARLE.—The American Promoting & Trust Co., 23 Doane St., Boston, offers for sale $500,000 first mortgage ten-year 6 per cent. gold bonds for 50 miles of this line, including branches. The road is projected from Southern Pines, N. C., east about 30 miles, to Fayetteville. Six miles of track was laid at last report. (June 30, p. 483.)

FREDERICK, THERMONT & NORTHERN.—The city of Frederick, Md., has granted right of way to this company for its proposed line from that city north 30 miles through Lewiston, to the Pennsylvania State line. L. Victor Baughman, of Frederick, is President. (Aug. 25, p. 603.)

GREAT NORTHERN.—Preliminary surveys show a grade of less than 1 per cent. on the proposed cut-off between Libbey Creek and Kalispell, Mont. The proposed route is from Batavia, up Smith's Valley and along Libbey Creek to Libbey, about 75 miles.

This company, according to report, will extend the Eastern Minnesota line from Milaca, north about 100 miles, to connect with the Duluth, Mississippi River & Northern.

HUNTINGTON & BROAD TOP MOUNTAIN.—Bids are asked for grading a proposed change of line from Tatesville, Pa., to Brallier's Summit, according to plan and profile at the office of Carl N. Gage, General Manager, Huntington, Pa. (Official.)

ILLINOIS CENTRAL.—Extra forces have been put to work on the Ft. Dodge & Omaha extension from near Ft. Dodge, 128 miles to Omaha, Neb. Track is laid for 65 miles and going down at the rate of two to three miles a day. It was thought recently that the line would not be completed before Jan. 1, but the company now hopes to have it ready a month earlier. (Sept. 13, p. 649.)

A contract is let, according to report, for an extension of the Yazoo Delta from Tutwiler, Miss., north toward Memphis, Tenn.

INDIANAPOLIS & FORT WAYNE.—This company was incorporated in Indiana Sept. 29, with a capital stock of $100,000, to build a line from Indianapolis, northeast about 120 miles, via Noblesville, Elwood, Marion and Huntington, to Fort Wayne. The incorporators are: C. Fairbanks, Demas Deming, Terre Haute; B. E. Parrott, Alexander Taggart, James E. Roberts, D. P. Erwin, S. E. Rauh, A. S. Benson, Henry Rauh, Raphael Kirshbaum, Edward F. Claypool, Geo. A. Dickson, Chas. E. Test, Henry S. Smith and A. E. Kalter of Indianapolis, and Fletcher S. Hines of Malot Park, Ind.

IRONTON.—Joseph Schwoyer, a contractor of Hokendauqua, Pa., is reported building a branch of this line from Egypt, Pa., to Butz's Farm.

LAKE PROVIDENCE & WESTERN.—The Chalmette Packet Co. of New Orleans, La., has become interested, according to report, in this line, proposed from Lake Providence, La., on the Mississippi, to run west 38 miles to Mer Rouge, on the St. Louis, Iron Mountain & Southern. The route is over a comparatively level country, requiring practically no cuts or fills. There will be 1,800 ft. of trestle work over small streams, but no bridges. Fully 80 per cent. of the right of way has been donated; also ample ground for terminals at Lake Providence and Mer Rouge. The State of Louisiana exempts from taxation for a period of ten years after completion all new roads built in the State prior to Jan. 1, 1904. J. E. Ransdell, of Lake Providence, La., is Secretary and Treasurer. (March 31, p. 235.)

MINNEAPOLIS & ST. LOUIS.—Rail laying is begun near Easterville, Ia., on the extension from New Ulm, Minn., south 138 miles to Storm Lake, Ia. The company expects to complete track laying between Easterville and Sherborn within the next 50 days. John Scott & Sons, of St. Louis, Mo., who have the contract between Storm Lake and Spencer, have practically completed the grading and were to begin track laying Oct. 2. The company hopes to have the entire line ready for traffic by Dec. 1. (June 30, p. 483.)

MINNESOTA & SOUTH DAKOTA.—This company, already incorporated in Minnesota, has filed articles of incorporation in South Dakota to build a railroad from Tyler, Minn., northwest 26 miles, to Lake Hendricks, S. D. Marvin Hughitt, President of the Chicago & Northwestern, is among the incorporators. (Sept. 8, p. 633.)

MISSOURI, KANSAS & TEXAS.—Grading is to be begun soon, according to report, on the Sherman, Shreveport & Southern extensions from San Marcos, Tex., southeast about 30 miles, to San Antonio; and from Jefferson, Tex., southeast 28 miles, to Waskom. Both extensions are a necessary condition of the absorption of the S., S. & S. into the M., K. & T. (June 2, p. 393.)

MOORE COUNTY & WESTERN.—A. C. Wilcox & Co., Drexel Building, Philadelphia, write that "in addition to the 12½ miles from Aberdeen to Craigownie, N. C., purchased from the Moore County RR., we have agreed, bridged, and have ties on the ground for eight miles more. The road has also been surveyed and cross-sectioned to the Pee Dee River, a distance of 41 miles from Aberdeen."—The Chronicle. (Dec. 8, 1898, p. 885.)

NEW YORK, NEW HAVEN & HARTFORD.—New rails are being laid, according to report, on the line from Pawtucket, R. I., to Woonsocket.

OHIO & KENTUCKY.—Bids are asked for grading 26 miles of this proposed line from Jackson, Ky. (terminal of the Lexington & Eastern), to run northeast through mineral and timber lands into Morgan

County. R. M. Broas, of Lexington, Ky., is Chief Engineer. (June 9, p. 417.)

OREGON ROADS.—John E. Bays, of Portland, Ore., has the contract for the line of the Booth-Kelly Lumber Co., of Eugene, to run from Henderson, on the Southern Pacific, northeast 22 miles up the Mohawk River. (Sept. 22, p. 668.)

The Federal Government has granted permission to the authorities at Fort Stevens to build a spur 800 ft. long, to connect with the Astoria & Columbia River line at Astoria.

PENNSYLVANIA ROADS.—Surveys are reported in progress for a line from Crabtree, terminus of the Crabtree branch of the Pennsylvania, to run north to new coal lands.

J. M. Guthrie is building a branch, 1½ miles long, in Indiana County, from a point near Homer City, on the Pennsylvania, to connect a new coal opening.

The Eddystone Print Works, at Eddystone, is building a private road from its works in that city.

Wm. L. Ziegler, of Philadelphia, Pa., has taker the contract from the Bureau of Yards and Docks of the National Government to build a road 1½ miles long in Philadelphia to connect with the Pennsylvania RR.

RIO GRANDE WESTERN.—Building is to be begun soon, according to report, on a branch line from Park City, Utah, to the Silver King and Anchor mines.

The extension from Provo City, Utah, northeast 31 miles through the Provo Canyon and Charleston to Heber is completed. (Sept. 15, p. 650.)

ST. LOUIS & SAN FRANCISCO.—Preliminary surveys are reported in progress for an extension from Joplin, Mo., southeast about 20 miles to Nehosho, another line of the company.

SAN MARCOS & TECOLUTLA.—Track laying is reported begun at Zaragoza, Mexico, on this line from San Marcos, State of Puebla, northeast about 250 km. (155 miles), via Tegiutlan, to the port of Tecolutla, on the Gulf of Mexico. Edgar Heymans, San Marcos, Mexico, is Traffic Superintendent. (July 28, p. 548.)

SANTA FE & GRAND CANYON.—About 30 miles is reported graded on this line from Williams, Ariz., north 73 miles via Flagstaff to the river of the Grand Canyon of the Colorado. Track laying is to be begun soon. J. H. Richards & Sons, Holbrook, Ariz., have the contract. P. F. Randall, Williams, Ariz., is Chief Engineer. (June 9, p. 418.)

SOUTHERN.—Application has been made in Tennessee for a charter for the proposed extension from Stevenson, Ala., northeast about 40 miles to Chattanooga, Tenn. A number of surveys have been made and it is reported that building is to begin soon. (Aug. 18, p. 589.)

SOUTHERN PACIFIC.—The people of Nacodoches, Tex., have raised over $11,000 for right of way through Nacogdoches County for the extension of the Texas & New Orleans new building from Cedar, southeast 25 miles, to Athens, on the St. Louis Southwestern. Bids are being asked for building. (Aug. 25, p. 604.)

The people of Wharton, Tex., are urging upon the company the desirability of building an extension from that city southeast about 80 miles to the mouth of Caney River, on the Gulf of Mexico.

SOUTH POTOMAC.—The Directors have decided to begin surveys at once on this line from Romney, W. Va., to run southwest about 60 miles to Franklin. The officers are given under Elections and Appointments. (June 30, p. 483.)

SUWANEE & SAN PEDRO.—This company has determined to begin building its line from Live Oak across the Suwanee River to Perry, Fla., 23 miles. R. B. Daniel, of Jacksonville, Fla., is acting President. (July 28, p. 548.)

UNION PACIFIC.—This company, according to report, will build a spur about five miles long from Park City, Utah, to the mouth of the Ontario drain tunnel.

WEST VIRGINIA ROADS.—The Marshall County Court has granted W. H. Schaffer and W. H. Ullum a franchise for a railroad from the mouth of Bogg's Run, near Wheeling, to run east 18 miles to the Pennsylvania State line.

GENERAL RAILROAD NEWS.

ALEXANDER & RICH MOUNTAIN.—Judge Jackson, at Wheeling, W. Va., on Sept. 25, handed down a decree for the sale of this road, which runs from Alexander Junction, W. Va., to Rich Mountain, 23 miles. It was placed in the hands of a Receiver on Feb. 16, 1899. (April 3, p. 163.)

BOSTON & ALBANY.—At the special meeting of the stockholders on Sept. 27 it was agreed by both parties to postpone the question of the lease to the New York Central until Nov. 15. A contest ensued on the election of Directors, which resulted in a compromise between the Protective Committee and those in favor of the lease. The old Board of Directors was re-elected, with the exception of C. Houghton, of North Adams, who withdrew. His place and two vacancies caused by death were filled by Richard Olney, Boston; A. G. Bullock, Worcester; and Eben S. Draper, Hopedale; of the Protective Committee. A letter from President Calloway of the New York Central & Hudson River contained the following statement:

This company has recently consolidated its system, and now controls its connections west and south. The arrangement is working to the entire satisfaction of all parties interested. As the New York Central and Boston & Albany have been working together to their mutual benefit for many years it seemed natural that we should seek a union with the Boston & Albany RR. The result has been the proposed lease to which you now refer. It is our desire that the lease shall contain every reasonable safeguard for the protection of the stockholders of the Boston & Albany and for the preservation of its property. If, in its present form, the proposed lease is deficient in these particulars, we are willing that it should be so modified as to secure these objects.

Certain of your stockholders have insisted that the amount of rental is insufficient, and that in fact the property is capable of earning, during the lease, a net revenue considerably in excess of the rental. In view of the constant demands for increased facilities, and the constantly increasing expense of the management of railroads, the New York Central Company considers the rental offered quite as large as it is warranted, by any prudent view of the probable revenue of the property during the long term of the lease, in offering.

It is further stated that the New York Central would consent to a reduction of the term of the lease from 999 years to 99 years, and to the insertion of an agreement "that, under a penalty of $4,000,000, no earnings or income of the Boston & Albany RR. Company should be taken by the New York Central for its own uses, or for any other purpose whatever than to make the payments and fulfill the obligations imposed upon that company as lessee under the lease." (Sept. 8, p. 633.)

CHICAGO, MILWAUKEE & ST. PAUL.—At the annual meeting on Sept. 23, the stockholders voted to merge by consolidation subsidiary lines in Illinois. (Aug. 4, p. 562.)

CINCINNATI, NEW ORLEANS & TEXAS PACIFIC.—Judge Taft in the United States Circuit Court at Cincinnati, O., on Sept. 30, took the property from the hands of the Receiver. S. M. Felton, the Receiver, becomes President, but it is understood that he is ultimately to give way to Samuel Spencer, President of the Southern Railway. The C., N. O. & T. P. is lessee of the Cincinnati Southern, which was built by the city of Cincinnati, and runs from Cincinnati, south 335.92 miles, to Chattanooga, Tenn. On March 18, 1893, the road was placed in the hands of a Receiver. Controlling interest in the capital stock is held jointly by the Southern Railway and the Cincinnati, Hamilton & Dayton. (May 26, p. 380.)

COLUMBUS, SANDUSKY & HOCKING.—H. M. Butler, at Columbus, O., has filed his final report as Special Master Commissioner. In this he finds that the prior lien mortgage is $2,250,000 and the general mortgage $8,192,901.33. Among the special liens are $6,000 mortgage of Gertrude Hess, administratrix, and two judgments of the Columbus, Hocking Valley & Toledo. The Monsarrat receiver certificates for $500,000 and $89,000 of "coupon notes" are held not to be a lien on the body of the road. Exceptions to the report must be filed by Oct. 9 and hearing will be before Judge Taft on October 12 and 13. (Sept. 15, p. 650.)

CUMBERLAND & OHIO.—Justice Geo. Du Relle, at Frankfort, Ky., on Sept. 21, handed down a decision affirming the opinion of the lower court that the Louisville & Nashville must continue to operate the Northern Division of this line until the completion of the foreclosure sale already ordered under the first mortgage. (Jan. 13, p. 35.)

INVERNESS & RICHMOND.—Q. G. McKane, a contractor of Nova Scotia, has entered suit against Peter Ryan, claiming that he and Mr. Ryan were partners in securing the option on the sale of this road last June, which was made finally to Mackenzie & Mann, and that he failed to receive his share of the proceeds. The line as projected is from Port Hawkesbury, N. S., via Port Hood and Margaree, to Cheticamp, with a branch to Orangedale, on the Intercolonial.

KICKAPOO VALLEY & NORTHERN.—This property was sold at public auction Oct. 2, at Madison, Wis., to A. J. Upham, representing holders of certificates, aggregating about $400,000. The sale was on foreclosure of a mortgage for $600,000 by the Central Trust Co. The road has been in the hands of a receiver since March, 1894.

LOUISVILLE & NASHVILLE.—Twenty thousand dollars has been set aside to buy South & North Alabama sinking fund 6 per cent. bonds at not to exceed 110. Bids received up to noon, Oct. 16, by the Union Trust Co., New York.

NORTHEASTERN OF GEORGIA.—Governor Candler of Georgia has fixed upon Oct. 31 as the date for the sale of this line. The upset price is $287,000, of which $100,000 must be paid down, a like amount a year later and the remainder on Nov. 1, 1914, interest at 3½ per cent. Each bidder must deposit a check of $5,000. (Sept. 29, p. 686.)

OREGON SHORT LINE.—A majority of the income A bonds, under the Union Pacific offer of exchange, have been received and the offer to terminate Oct. 16. (U. P., Sept. 22, p. 688.)

PEORIA, DECATUR & EVANSVILLE.—Walston H. Brown, Chairman of the first mortgage bondholders' committee, notifies holders of Central Trust Co.'s certificates of deposit for first mortgage bonds on both divisions, that the Central Trust Co. will advance six months' interest on the same at five per cent. after Oct. 1. (April 7, p. 255.)

RICHMOND, NICHOLASVILLE, IRVINE & BEATTYVILLE.—An order was entered in the United States Circuit Court at Louisville, Ky., on Sept. 20, transferring this property to the Louisville & Atlantic, the successor company. A balance of $228,539, due from the purchaser, Adolph Segal, is to be applied to paying off $96,317 receiver's certificates. Of the remainder, $132,222 is to be divided among holders of mechanics lien claims and $12,419 is to be distributed among the small claimants. The road was sold on May 2. (May 5, p. 326.)

ST. LOUIS, INDIANAPOLIS & EASTERN.—The United States Circuit Court at Springfield, Ill., has ordered a payment of $631.33 on each of the company's bonds as its share of the proceeds of the foreclosure sale. (Aug. 25, p. 604.)

The Illinois Central took control of this property on Oct. 2, as agent for the purchaser.

ST. PAUL & DULUTH.—Preferred stock to the value of $204,500 has been drawn for cancellation at par, at the company's office, 32 Nassau St., New York. (Aug. 18, p. 590.)

SIOUX CITY & NORTHERN.—This property was taken from the hands of a receiver on Oct. 3. It went into the receiver's hands Oct. 5, 1893. (Nov. 18, 1898, p. 840.)

STATEN ISLAND RAPID TRANSIT.—Hallgarten & Co.'s certificates of deposit for the five per cent. second mortgage bonds, under the agreement of July 5, are being exchanged for new four per cent second mortgage gold bonds of the new company at the Central Trust Co., New York. (Sept. 8, p. 634.)

WISCONSIN CENTRAL.—George Coppel, Chairman of the Reorganization Committee, gives notice that new securities, under the plan of reorganization of April 10, will be given out on presentation of certificates of deposit to the U. S. Trust Co., New York, on and after Oct. 4. (Sept. 15, p. 650.)

TRAFFIC.

Philadelphia Car Service Association.

The annual report of the Philadelphia Car Service Association for the year ending August 31 has been issued by the Manager, Mr. J. E. Challenger. This Association takes in the Pennsylvania Railroad as far west as Altoona and Erie; the Philadelphia Division of the Baltimore & Ohio, a number of lines in Southern New Jersey, all of the lines of the Philadelphia & Reading and considerable other territory. The total number of cars dealt with during the year was 1,356,417 and the average detention was 1.49 days, which is about 10 per cent. longer than the average of the preceding year. The total collections were $51,849; total refunded, $4,744; net collections, $47,105; expenses, $23,501; cost per car, 1.7 cents. The gross collections were 38 per cent. greater than in the preceding year, and the net collections 43 per cent. greater, but the cost of operation was about the same. The cost per car in the preceding year was two cents. The total collections averaged 3.82 cents per car. The cost of operating the Association has gradually decreased from $37,682 in 1892 to $23,501; and the cost per car from 2.9 cents to 1.7. The percentage of collections refunded was in 1893 over 16 per cent.; this year it has been only 9.15 per cent.

Chicago Traffic Matters.

Chicago, Oct. 4, 1899.

A battle royal is on in passenger rates among the Chicago-Missouri River lines. Scalping on the part of one of the weak lines, the meeting of this competition by the Chicago, Milwaukee & St. Paul and the gradual extension of the secret manipulation to Omaha and Kansas City are the causes of the trouble. The Rock Island finally put in a one-way rate of $10 from Chicago to Kansas City and to Omaha. All the roads followed and then the Alton cut off another slice, reducing the Kansas City rate to $8.50. This was also met by all other lines, and the Omaha rate went down to $8.75. Then the St. Louis-Kansas City roads reduced the rate between those two points to $5. Thus far the St. Paul territory, where the trouble originated, had not been touched, but now the Rock Island comes out with a notice that it has knocked down the St. Paul rate to $7.50, a cut of $4. The Wisconsin Central went the Rock Island one better by applying this rate southbound from the Twin Cities as well as northbound, which, of course, caused the others to take similar action. And here the matter rests, and probably will rest until after the low rates that are now in effect from all Western Passenger Association territory to Chicago on account of the fall demonstrations, are withdrawn. There is no prospect of peace until the Milwaukee, the Wisconsin Central, the Great Western and the Minneapolis and St. Louis roads agree to join the Western Passenger Association.

Officers of the roads leading into the Southwest are pleased at Judge Thayer's decision in the so-called boycott case against the Kansas City, Pittsburgh & Gulf road on account of the latter's persistent refusal to advance its New York-Kansas City rates to a reasonable basis. While the court does not rule on the boycott feature of the case, it decides that the "P. G." must restore rates from New York via Gulf ports to Missouri River points to the basis of $1.37. Following is the text of Judge Thayer's decision:

"As a rule, a railroad in the hands of receivers for the purpose of foreclosure should not handle any traffic except at rates which are reasonable and remunerative. Unremunerative rates, even if they do not entail actual loss, ought not to be put in force on railroad property in judicial custody merely for the purpose of forcing concessions from other carriers, unless the concession is one of paramount importance, which clearly ought to be granted. Especially is this true where such action is liable to affect rates generally and disturb the conditions under which business is transacted where the existing rates are not shown to be unreasonable.

"Now, whether the existing conditions are such that the gulf lines are entitled to the differential claimed according to the former practice and usage of railroads, is, as I conceive, a debatable question, concerning which different opinions may reasonably be entertained. Plausible arguments may, doubtless, be made on both sides of this issue. It is not clear to my mind that the contention of the gulf lines on this point is tenable. At all events, I am not so well satisfied that they are right, and that the concession ought to be granted, as to embark the line which is now in the custody of the court in an effort to force a concession of a differential with all which such action implies.

"When a road passes out of the hands of the court and into the hands of its owners, they will, of course, be privileged to form their opinion concerning their right to a differential and the policy of endeavoring to enforce it by a rate war, and they will be free to adopt any rate which agrees with their views on this point. The court having a property in charge for a temporary purpose and holding it in trust, so to speak, has less freedom of action than the owners of the property. It does not deem it expedient to enforce rates which are not fairly remunerative and which create universal dissension and excite a protest, even on the part of other gulf lines—to enforce a claim which on a broad view of the question, and on further examination, may not prove to be well founded.

"I shall accordingly direct the receivers to conform to the lowest rate which may be put in force by the South Atlantic lines, provided those lines shall not establish a rate which is higher than the one which was put in force by the Pittsburg and Gulf in March, 1899."

The main question in the case, concerning the right of the complainants to an injunction, the Judge reserves for further consideration; but if rates are restored there will of course be no occasion for an injunction.

After several months of consideration, the General Passenger Agents of the roads in the Western Passenger Association have decided to make no change i nthe present form of interchangeable mileage ticket (the Sebastian form). General Passenger Agent Heafford submitted a minority report, advocating a trial of the form of ticket used by the Michigan lines. He says that lines joining in the use of the Michigan ticket might also continue to use the Credential System, so that a fair trial could be given of the two systems side by side—say for six months, or a year.

The provision rate war in the Missouri River Southeastern territory is settled. The rates went to rock bottom before they were cancelled. The Burlington hauled this traffic from Omaha to Southeastern common points for 1 cent per 100 lbs., and the lines from Kansas City made a similar rate to Memphis and other common points.